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90FE0038D Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 6 Mar 90 p 1

[Article by Han Yuqi [7281 3768 3825] and Wang Jianmin [3769 1017 2404]]

[Text] In the national working conference on science and technology, the Standing Deputy Director of the State Science & Technology Commission Li Xu'e [2621 1331 6166] stressed that in 1990 the effort to reform S&T will be continued and more work will be done to form a complete policy and management system.

Li pointed out that the present reform policy for the S&T system will not change; it will be reinforced, perfected and deepened. The specific content of the policy includes the following six items.

1. Continue to implement the director responsibility system at research institutes.

Scientific research organizations will continue to practice the leadership management system centered on the administrative head, that is, the director responsibility system. In the meantime, the central political role of the Party in the base units in research organizations will be further clarified. The main tasks of the Party organization are: establish the Party in research organizations, lead political thought work and spiritual cultural construction, support the director in carrying out duties, assure the completion of work assignments, make sure the policies of the Party and the country are thoroughly implemented, and ensure that the research institutes adhere to socialist direction.

2. Continue to practice the contract responsibility system.

Based on the particular situations of a research institute, continue to gain experience and gradually improve and perfect the contract responsibility system. Try to develop the overall potential of an institute and avoid overfragmentation of the contracts. Coordinate relationships both in the vertical direction and in the horizontal direction. Accomplish the national projects with assured quality and quantity. Pay attention to the depth in the organization in order to give research a lasting power.

3. Continue openness, flexibility, and support various technological economic activities.

In the process of consolidation, the preferential policy of the nation toward technological economic activities should continue to be implemented in order to promote stable progress in the technical markets. Conscientiously carry out the "People's Republic of China Technological Contract Law" and the associated detailed regulations for implementation. Further improve the technical market management mechanism, the intermediary organizations, and technical contract arbitration organizations. Work on the drafting of arbitration regulations and management regulations so that the management of the technical market may be gradually put on a basis of laws and codes.

Continue to encourage research organizations to create economic entities that combine technology, industry, agriculture and trade and various technology development companies, consulting firms and services. Actual practice since the reform has shown that for economic development in China, it is effective for research organizations to start technology-economic entities (i.e., companies). This approach is also an important direction for the S&T system reform of today and of the future. The business activities of the research organizations must be strictly separated from the business activities of the Party and government organizations; and there is no regulation calling for the de-coupling of a company from the unit that created the company.

The research organization must strengthen the management of the companies it created. The management of a business must strictly follow the established codes and the development of the company must benefit the integrated endeavor of the research institute to conduct research, production, and business. The company should not be independent of the research organization. Research institutes with the resources should strive to become technology-oriented business groups.

4. Promote the S&T allocation system and improve the matching system.

The allocation system reform is an important policy in the reform of S&T. It plays a major role in transforming the operating system of research institutes and in promoting S&T to contribute to economic construction. Different institutes will continue to be managed by categorizing the funding money.

In recent years, financial, tax, and revenue departments have set up a system of policies to help S&T development and system reform. In particular, some major policies long awaited by the S&T profession have been established since the end of last year amidst financial difficulties of the nation. The State Science & Technology Commission and the Ministry of Finance have jointly issued the "Notice regarding the two special payments by scientific research institutes". It was stated in the notice that, in the commercialization of research results, the interest payments of loans made to research institutes may be reduced by the amount of special-fund expenses for S&T development in the same unit and by the amount of fixed-asset depreciation funds. With this new rule, 80 percent of the original payment can be waived. Also, the State Revenue Officeand the State Science & Technology Commission jointly announced the "Regulations regarding waiving research institute from paying income taxes on intermediate test products." Theses regulations clearly defined the scope of intermediate test products and the period for income tax waiver, and extended the waiver to research/production consortiums formed jointly by research institutes and

enterprises, and to medium and small enterprises run by research institutes. Starting this year, the People's Bank of China is providing S&T loans under the national general loan program. Other associated specialty banks have also established S&T loans. Special preferential policies with regard to taxing and pricing have been extended to national-level new-product test manufacture projects by the State Science & Technology Commission, the State Revenue Office, the State Pricing Office, the Industrial and Commercial Bank of China, and the Ministry of Materials. The four policies described above and the associated policies regarding the development of new high-tech zones will have a major promotional effect on the transformation of research institutes and on the role of S&T in economy.

With the advances made in financial, tax and loan policies, the mechanism for the commercialization of research results has basically been formed. Furthermore, the average reduction in business fees for developmental research institutes under the jurisdiction of departments in the State Council has also reached the proper level of reduced allocation. Therefore these research institutes should strive for the completion of the business fee allocation reduction. Developmental-type research institutes under the jurisdiction of local governments should strive for the completion of business free reduction in 1991. The actual timetable of the various departments and the local governments should be based on the actual situations at each place and there should not be a rigid universal schedule.

5. Continue to liberalize the management policy for S&T personnel.

Since last year the number of S&T personnel engaged in technological economic activities at the front line in the villages and on the market has decreased. This change was caused by some unnecessary restraints that appeared in local regions and the concern of S&T personnel that the policy may change. The administration should pay attention to this change and clearly assure people that the set policy will not change. We should continue to encourage and support S&T personnel to go to the front line and conduct technological economic activities with compensation, and start various technological economic entities for reasonable financial returns. Continue to implement the policy that allows S&T personnel to hold spare-time jobs. After the completion of the regular job and without infringing on the economic interests of the home units, S&T personnel should be allowed to engage in spare-time activity and receive reasonable pay. This policy is important in fully developing the potential of S&T personnel. The main problem in the implementation of this policy has been that diverse spare-time activities have interfered with the regular jobs, and in some cases have even hurt the economic benefits of the home units and affected the stability of the S&T ranks. Faced with these negative effects, some units have tried to limit the activities. It is wrong to limit these activities because it will also limit the positive effects of spare-time activities. These activities should be allowed to continue and should be organized under the leadership of the working unit. Activities organized by the S&T personnel themselves should be reported to the home unit and support and assistance should be sought from the home unit. Spare-time activities should be guided and managed so that the adverse effects are eliminated and the benefits are derived.

6. Strengthen the management of collective, individual, and private technology organizations.

Today there exists the problem of unclear jurisdiction in collective organizations and the problem should be resolved while proper consideration is given to the interests of the parties involved. The ownership of national, collective, individual, partnership, and private organizations must be rigorously classified and the property relationship and rights and responsibilities relationship should also be further clarified. Together with industry and business administration departments and state property management departments of the government, the State Science & Technology Commission has formulated specific regulations regarding the management of such organizations and the property ownership; these regulations will be soon released.

In the last few years good results have been obtained in technology system reform test cities, including Harbin, Shenyang, Nanjing, Huangshi and Guangzhou. Based on these experiences, work should continue and be broadened.

CAS Accomplishments in High-Tech Development Reviewed

90FE0038B Beijing XIANDAIHUA [MODERNIZATION] in Chinese No 1, 23 Jan 90 pp 10-12

[Article by the Policy Bureau of the Chinese Academy of Sciences]

[Text]

The History of High-Tech Development

China has a unique situation in science and technology and in economic development. On the whole, because of historical needs in defense and construction, development in science and technology is leading that in the economy. By exploiting the advantages of a socialist planned economy, China has amassed considerable manpower and money for science and technology development, which, as a result, has exceeded economic development. This difference has on the one hand made the development of high-tech industry possible in a backward economy, and on the other hand has made the science and technology face great difficulties with regard to economic construction. Due to the drawbacks of the traditional system of science and technology, the research results of the Chinese Academy of Sciences (CAS) have remained mainly in the "samples, gifts, and display pieces" category instead of moving into the

products and commodities category and contributing to the economic construction. Because of this, CAS was under a great deal of pressure in the mid 1980's and the news media simply equated the Academy with the proverbial "ivory tower". Under this type of pressure and being the first to implement expense management reform, the Academy has actively sought cooperation with more than 20 provinces, regions, and municipalities and has entered into agreements with them. Contracts with 3000 enterprises have also been signed. Despite the great efforts made by the Academy, the results are less than satisfactory; the one-sided efforts by the S&T profession have not been reciprocated by industry; most of the cooperation became "going through the motions", with no substantive results. Even in implemented technology transfers and cooperative arrangements, high-tech has been less popular than low-tech and the returns to the S&T side have been far less than their value. This has greatly harmed the self-esteem and enthusiasm of S&T personnel. Furthermore, wherever departmental interests have been involved, there have been a multitude of obstacles that posed great resistance to technology transfer and extension. After some painful experience, the leaders of the Academy realized that, in order to contribute to economic development, it was not enough under the present situation in China to just advocate the establishment of the needed policies and regulations for S&T to play its role in the industrial escalation: the major institutes and universities must rely on their own strength and organize the development effort. This includes organizing their own companies and conducting their own development and management. This was the beginning of high-tech development in CAS.

Modes for Developing High-Tech Industries

The companies and entities that emerged from the Academy's effort of developing high-tech enterprises may be categorized into the following six types.

1. Accumulate commercial capital for a technical product and gradually develop into a business

In the competition for high-tech development, companies with advanced technology and sound management often take the lead and achieve rapid development and growth. The company of the Computing Institute under CAS is one such example. The company was established in 1984 with a total investment of merely 200,000 yuan; people and equipment were all from the Institute. The company started accumulating capital from the sales of the main technical products, computers and accessories, and enjoyed very rapid growth. By 1988, the company had had total sales of 130 million yuan and assets of 20 million yuan. The Lianxiang ["Legend"] Chinese card produced by the company was a major product on the international market. In April 1988, the company started the Hongkong Lianxiang Company in Hongkong and within one year reached a sales volume of HK$120 million; the current monthly sales have stabilized at HK$22 million or so. The goal of this company is to form a high-tech enterprise that has an eye on the outside market; to this end, it took the "high road" management approach and established a number of branch companies and subsidiary companies to expand its market share. In the meantime, it is gradually making the transition from software development and device production to whole-machine production.

The lesson from the computer company is that one of the possible approaches is for a company to start with advanced technology and sound management in its commercial activity and to move toward an industrial base. Like snowballing, a single company can grow into a big industry.

2. Departments and special zones collaborate in business development

This was the mode with which the Shenzhen Science and Technology Park was built. In 1984, CAS and the Shenzhen Municipal Government jointly established the Shenzhen Science and Technology Park, Inc., for the purpose of high-tech development. The Academy invested 10 million yuan and some technical personnel. The Shenzhen government also invested 10 million yuan and 3.2 square kilometers of land. The idea was to exploit the special economic environment of the Shenzhen Economic Zone to create an incubator for high-tech enterprises. These high-tech enterprises are then to become multidisciplinary companies in the form of the Shenzhen Science and Technology Park, Inc. Judging from the present situation, the progress has been rather smooth; the capital construction phase has already been completed. It may be taken as the role model of large-scale departmental and local government cooperation and investment. Because of the special geographic location and economic atmosphere of Shenzhen, the Shenzhen Park may become a business incubator for CAS and an entity of the Academy for research, development, engineering, intermediate testing, production and market development and management. It will also be a major window for the Academy to develop outward-going industrial businesses.

3. Direct investment by large institutes and universities and to develop business based on technology

An example for this approach is the Sanhuan Company of CAS. In 1985 scientists at the Institute of Physics of the Academy developed a third-generation permanent-magnet neodymium-iron-boron material only three months after the United States and Japan. They did not follow the usual practice of the past, instead; they seriously considered the industrial value of the research result and studied how to convert the result into production. After repeated deliberation and under the support of the Academy, they started the Sanhuan Company and began direct investment in the production of neodymium iron boron. They even considered the ways to apply the new material to a new generation of electrical motors. They sought investments on the market and collaborated with local governments to establish several

plants. They have also placed their products to the foreign market and pioneered a new path for advanced research results to enter outward businesses directly. The mode of major institutes or universities directly invest in production business is still rare in China.

4. Organize enterprise groups

In order to strengthen enterprise groups and to facilitate the transformation from "quantity" to "quality", the Academy selected similar companies and formed business groups. Examples are Daheng, Datong, Cailiao and Baitai. Some larger companies started forming technology-driven business groups in order to strengthen economic resources. For example, the Keli High-Tech Company formed the Keli High-Tech Group with the No. 528 Plant under the [State] Commission for Machine Building and more than 20 local enterprises in Fujian Province. Such business groups can benefit from the advantages of integrated capital, multiple specialties, personnel, and management operation. They may be figuratively called "collective" business. It should be pointed out, however, a number of problems exist in these collective companies and further development in standardized management will hopefully solve the practical problems.

5. High-tech leading the practical technology and forming a business

The Sanda Coal-Gas New-Technology Development Company was established jointly by CAS's Commission on Energy Resources, the Chinese Huaneng Engineering Company, and the Dalian Institute of Chemistry and Physics. The purpose of the company is to produce gas for city use by converting coal gas to methane. Using the company as a base, a lateral union group was also formed to do business in medium and small-city gas projects and to develop new gas technology. The group consisted of research, design fabrication, installment, production and training units. Units joining the company now include the Dalian Institute of Chemistry and Physics of the Academy, the Liaoning Provincial Institute of Petrochemical Design and Planning, the Wafangdian Gas Company, the Qingpu Chemical Company, the Dalian Tianhua Boiler Works, and the Qingpu Hydraulic Machinery Plant. The coal-gas-to-methane catalytic technology is the center of the entire coal-gas production technology and this high-tech process is under the control of the Dalian Institute of Chemistry and Physics. The unique features of the technique are high efficiency and low pollution. The company worked to combine this technology with the coal-gas projects in the cities in order to accelerate the development of China's urban coal-gas industry. For the contracted engineering projects, the company hired construction units to do the construction, but the company did the design, fabrication, and installation, and provided the catalysts, the personnel training, the system startup and adjustments, and the associated furnaces and such. In other words, the key technology of catalysis has set the whole gas industry in motion and had an extremely strong controlling power. Using this technology and sound organization, existing enterprises may be attracted to join the group. Then, without any increase in investment, the design, production, installation, training, and operation can all be expanded for the company to enter a higher state of economy. This has been quite a rare case in the Academy's S&T development.

6. Establishment of outward-looking high-tech enterprises using both domestic and foreign investments

In 1986, the Defu Optoelectronics Technology Company of CAS's Shanghai Institute of Technical Physics and the Japan Ceramics Company each invested 50 percent in the establishment of the Nisaila Transducer Company. Based on the desire of mutually beneficial economic and technological cooperation between China and Japan, the two sides cooperated in the production of high-tech sensors, transducers and infrared (IR) filters. The Chinese side provided the technology for IR filters and major production facilities, and the Japanese side provided lead zirconate titanate (PZT) transducer fabrication technology and equipment and management methods. In addition to the production of transducers and filters, the company also developed a new series of products and engaged in technical services and technology-transfer activity. These products were sold mainly abroad. In 1988, 96 percent of the transducers were sold in Japan for more than 8 million yuan at a net profit of 3 million yuan. This company has been recognized as one of Shanghai's advanced enterprises and exporters with foreign investment.

Exploring the Avenues for Major Research Institutes and Universities To Develop High-Tech Business

The economic and technological reality in China today dictates that the development of high-tech industry in China cannot follow the traditional mode of industrial development. After reviewing the six modes of high-tech development described above, we believe that one of the feasible approaches is for the research institutes to take the initiative, to go through a maturing phase on the market and to accumulate early-phase experience, followed by business mergers and formation of groups, and finally to establish an outgoing high-tech industry under the stock-system economic format.

1. The initiative

Most of the high-tech enterprises in China had their origin in the research institutes. China's current aerospace and nuclear industries were developed by major institutes of CAS and then transferred to business departments. We believe that high-tech industries cannot be bought; technological import must be combined with the S&T resources of China's research institutes. Based on our own technology, we can further strengthen the technical base by digesting the imported technology and then make our own innovation. There will be a considerable length of time during which the high-tech enterprises created by the research institutes must follow through the route of research, development,

production, and sales. The intimate relationship between research and development must be maintained so that the company's development effort has strong research support. High-tech enterprises formed in this manner will be able to compete in the long term.

2. Market maturation and accumulation of early-phase experience

Most of the high-tech enterprises of CAS were born in the midst of the market mechanism and competition. In the actual development process of these enterprises, they all faced extreme shortages of capital in the beginning and could not get to the traditional investment channels. These companies could only achieve viability via the combination of know-how and trade and then succeeded in accumulation of capital. There have been many opinions and comments made regarding the excessive participation of technology development in trade and the comments were well based. However, it is more important to realize the difficulties faced by these companies in their initial phase, and to help these companies by establishing a sound market mechanism and other associated measures.

3. Merging and formation of groups

High-tech companies maturing on the market and gaining early-phase experience have a number of avenues leading to an established business. For example, a company may follow modes 1, 3, 4 and 6 described above. The merging and group-forming mechanism described in mode 4 are the most popular; the other modes require special conditions. CAS has made some attempts in this area but has encountered some problems and had no success due to limited time. Theoretically, however, business mergers are an important way to achieve rapid development for high-tech companies.

4. Standardized management

Our high-tech companies are all started by technical people and the companies always suffer "growing pain" when they reach a certain stage. The problems include confusing asset relationship, lack of scientific management, and a lack of experience and knowledge in obtaining domestic and foreign capital, and in starting business in foreign countries. We must therefore strengthen our management standards. We believe that the hope is in the stock economy. The stock system will help the companies attract new investments and clarify the asset rights. It will also facilitate the development of mergers and consortiums. (One of the reasons that the Academy did not succeed in forming a consortium was the unclear economic relationship between the members). Moreover, a stock economy would also help attract foreign investments.

5. Outward-facing companies

Because of the limited high-tech market in China, a successful high-tech company cannot limit itself to the domestic market only; it must face the international market in order to become prosperous. More important, the competition of the high-tech market is in itself international; "Chinese priority" is meaningless in an open market. The success of the Lianxiang Group and the Nisaila Company is an excellent example.

Toward the road of high-tech industrial development, CAS has made some fruitful attempts and gained some experience, but there are many problems that remain to be solved. We believe that the large research institutes in the Academy are fully capable to playing a major role in the development of China's high-tech industry as long as we obey the internal rules of scientific and technological development and the rule of coordinated development in S&T and economy.

Promoting Role of Defense-Related S&T in High-Tech Development

90FE0038C Beijing XIANDAIHUA [MODERNIZATION] in Chinese No 1, 23 Jan 90 pp 12-13

[Article by Wang Luye [3769 6424 8763]]

[Text] After the Revolution, China started building a defense industry from scratch and developed a defense system complete with research, testing, and production. The category includes nuclear, aviation, electronics, weapons, ships and space. The defense system has greatly elevated China's defense status and carried forward the development of such high-tech industries in China as aerospace, communications, computer, new materials, and nuclear energy. It has also promoted the advancement in traditional industries such as metallurgy, chemical engineering, petroleum, machine building and textiles.

After 30 years, the defense industry has acquired some high-tech capability. About 30 percent of the defense enterprises, with 35 percent of the staff and 36 percent of the engineers, are engaged in high-tech production. The defense industry now has tens of billions of yuan in fixed assets, with a considerable fraction in high-tech. Making full use of the defense industry will have a great impact on many fronts, including the production of high-tech products with high added value, the expansion on the international market, the improvement of China's traditional industry, the alleviation of China's energy, transportation, and raw material industries, the implementation of major national projects, the introduction, digestion and innovation of foreign technology, and the development of local economy.

The Precursor of High-Tech Development

In recent years the defense S&T industry has adopted a policy of combining defense industry with civilian industry. This policy is aimed at developing the potential in technology, personnel, equipment and management. Products with high added values were produced to replace imports and for exports. These practices have

demonstrated that the policy was correct; it was consistent with China's industrial policy and it avoided the competition between defense and civilian industries. For example, the No. 725 Plant of the [China] State Shipbuilding Corporation provided large-diameter expansion joints with a service life of 50 years for Beijing's thermal engineering to replace imports. The large-screen monitors developed by the No. 708 plant have been selected for use at the Asian Games. The micro-size speed radar developed by the No. 724 Plant has filled a void in China's modernization of traffic control. In China more and more high-rise buildings are being built and there is an urgent need for fire prevention. Realizing the need for developing fire alarms, the No. 262 Plant of the [China] Nuclear Energy Industry Corporation made use of the plant's strength in weak-current detection, ionization chambers and nuclear instrumentation and developed fire alarms. They have also developed nuclear medicine instrumentation, environmental monitoring and isotope equipment. These products have captured most of the domestic market and have also been exported. The Nanjing Machine Tool Plant has produced fully automatic multifunction lathes with 1980's technology. The key components are the TX-8 numerical control system and the GPS monitor system. The Nanjing Machine Tool Plant took advantage of military technology and achieved mass production. In 1988 alone, the plant fielded 70 orders and saved more than US$1.4 million for the state. Based on preliminary statistics, the civilian products manufactured by the Shaanxi Province defense industry alone have included more than 30 items that replaced imports.

High-tech industry is always intimately connected with the international market, for two reasons. First, high-tech industry can maintain its vitality and competitiveness only when it faces the international market. Second, high-tech products need the complement of foreign components and technology; without them, high-tech products will not generate foreign exchange. Therefore, when the defense industry tries to develop high-tech enterprises, it must rely on technology and intelligence and it must survive and thrive on the international market. The defense industry has made good progress in this regard in recent years. For example, Guizhou Province has more than 400 products generated by the defense industry available for export; it created US$20 million of foreign exchange in 1988. The defense industry in Liaoning Province has put dozens of products on the international market and averaged an annual export value of 360 million yuan. Jiangxi Province developed its mineral resources such as rare-earth products and carborundum; more than 100 products have been put on the international market and they exceeded 400 million yuan in export value in recent years. In Hunan Province the defense industry established three export bases to export 25 products; the foreign exchange created in 1988 was US$18 million. In Sichuan Province the export of defense-produced civilian products has been increasing at the fast rate of 44.8 percent. In 1988 Sichuan's defense industry created US$44.3 billion and has become the major item in Sichuan's export of electrical machinery products.

High-tech industry is a group of businesses in a multitude of technologies. The main indicator of the economic benefits of a business is the added value. Whether there can be any added value depends on the integrated use of the various growth factors. In China's development of high-tech industry, we should make use of the defense industrial base in different technologies and equipment systems and launch into more national construction projects. We should improve China's basic industries of energy, transportation, and raw materials and develop complete systems of optical and electrical technologies. There have already been many examples of success in this area, such as the 325 civilian airplanes, including 52 "Yun-7" airplanes, that have become China's workhorse in branch airlines. The new generation of textile machines built by the defense industry have elevated China's textile industry quality.

Another important function of the defense industry is the boosting of local economy. The practice of limiting the defense industry to the manufacture of a single military component has in the past severely hampered the economic potential of the defense industry. Since the Third Plenum Conference of the Eleventh Central Committee Meeting, the defense industry has adopted a new policy of combining defense and civilian industries and moving into the main arena of the national economic construction. With the advantages in advanced technology and systems, the defense industry is destined to make a major impact and to have a lasting effect on the local economy once it is combined with the civilian industry and economy. When inland defense industry participates in the high-tech research park activities in the open zones on the coast and joins forces with the coastal enterprises, it will not only expand the activity space and information exchange of the defense industry, but will be a shot in the arm for the coastal industry. Statistics shows that at this time the aerospace industry alone has 429 business "windows" in the coastal zone that have an output value of 330 million yuan and a profit of 42 million yuan. The defense industry in Guizhou Province has opened 130 business windows on the coast and Sichuan Province has 99.

In the meantime, defense technology industries at various places have joined up with local enterprises and formed different forms of economic consortiums for an all-out technological-economic cooperation and local economic revival. In the aerospace industry alone, 985 economic consortiums have been formed. The reality is that the defense industry can accomplish a great deal in the development of high-technology.

Strategic Goals and Priorities

The development of high-tech industry is in itself an international competition; it is a competition of the intelligence, economy and the general strength of a

country. In this competition China is still in a weak position and faces many difficulties and adversities. These are the facts and should be the starting point of our consideration in strategy and policy. The current reform of the national economic development is placing additional demands on high-tech industry. In this situation of hope and difficulties and challenges and opportunities, it is imperative that the defense industry finds a path for high-tech development that suits the Chinese situation.

In the high-tech development by the defense industry, there must be a limited target and a plan for systematic progress and breakthrough. When the high-tech products of China's defense industry are compared to the advanced world standards, there is a gap of about 15 to 20 years. The development in China still relies on the introduction of money and people, and has not reached a stable development track that is based on technology. Most of the products are low-to-medium quality, and a few products have reached international standards. The main difficulties in China's high-tech industry are the shortages of capital and people, the weak industrial base, and the immature market. Ours is a major socialist country, so the import of foreign technology from advanced nations is often limited. To import defense-related technology is to encounter a multitude of obstacles. We must therefore start from this reality, set limited goals and strive for breakthroughs in certain areas. We should start with medium and low-grade high-tech products or parts and gradually acquire some results, accumulate some capital and technology, train some staff and then make the transition to high-quality high-tech products. We must avoid chaotic and unplanned rash actions.

The high-priority industries for the defense industry are the electronics and communications industry, the integration of optics and electrical machinery ["opto-mechatronics"], and the aerospace industry. Criteria used in selecting high-priority industries should include the industrial base, the technological base, social and economic benefits, market prospects and effects on other departments; in a word, whether China has the ability to support the industry under consideration. Electronics and communications is the most active industry today. It is highly proliferative and is needed by the various profession and business. In the electronics area, China had a good foundation, but due to various missed opportunities, the industry still has not matured. A major effort to develop the electronic and information technology and the integration of optical and electrical machinery will have profound impacts on a number of areas. The benefits include the improvement of traditional defense industry and the product quality, the breaking of bottlenecks in key national industries of energy, transportation, raw material, and communications, the competition of high-tech products on the international market, the escalation of traditional industry and the overall development of the national economy. The defense industry has substantial strength and potential in electronics, communications and integrated optical and electrical machinery, so these areas should be high-priority areas targeted for breakthrough and for coordinated general development.

In the 30 years since 1956, China's aerospace industry has been a priority high-tech industry and has achieved initial maturity. Today China's aerospace industry has begun the stage of application and commercialization and has entered the international market. In the next period, the aerospace industry has three goals. First, establish satellite applications in communications, broadcasting, weather, resources, and survey. Second, serialize the launch vehicles. Third, compete in the international aerospace market. China's aerospace industry is well founded and is advanced in technology; it is an industry with a bright future. The development of the aerospace industry will not only bring enormous economic benefits to China's economic development and defense construction, but will also bring along the other industries.

The various branches of the defense industry should all seize the opportunity to develop their own potential and unique high-tech products. The nuclear industry should stress nuclear power and isotope radiation technology in order to improve China's energy structure and ease the energy shortage. The aircraft industry should stress the development of main-route and branch-route aircraft, the participation in international cooperative ventures, and the development of badly needed transport planes and helicopters. These activities will improve China's transportation structure and alleviate the shortage in transportation. The weapons industry and shipbuilding industry should stress the development of integrated optical and electrical technology and its application in traditional products. The objective is to improve the performance and quality of products and to move toward electronics and intelligent systems; the result will be a higher added value for traditional industries.

The vast experience of developing high-tech industries in various countries and China's practice of economic system reform have clearly shown that the development of high-tech industry requires a sound operating system. In contrast to traditional industry, high-tech industry is characterized by the intimate coupling between knowledge, intelligence, and production, by the intense competition and the higher risk on the international market and by the stronger sense of innovation. All these features will require the defense industry to drastically change the customary management style and production mode, and to establish a new system of operation.

Contribution of Higher Education to High-Tech Development Studied

90FE0038A Beijing XIANDAIHUA [MODERNIZATION] in Chinese No 1, 23 Jan 90 pp 8-9

[Article by Yang Renbao [2799 0088 1405]]

[Text] China's present high-tech industry has benefited from the development in higher education. In the 1950's

China organized the training of specialists in six emerging disciplines: automation, electronics, semiconductors, computers, jet propulsion, and atomic energy. In the area of semiconductors, solid-state physicists from five universities including Beijing University jointly established the semiconductor physics discipline and laid a foundation for China's semiconductor industry. In the area of computers, China has trained 100,000 specialists. In electronics, China has trained 238,000 college students. The distinguished achievements of China in space and nuclear technology are closely related to the training of jet propulsion and nuclear engineering personnel in the 1950's. After the Third Plenum of the Thirteenth Party Central Committee meeting, China has added information engineering and bioengineering to meet the needs in high-tech research and development. High-tech oriented disciplines in China's universities have increased from 9 percent in 1963 to today's 17 percent. In the training of graduate students, the percentage is even higher.

The development of high-tech industry requires a new generation of academic leaders and technology industrialists. Since there exists an age gap in China's science and technology ranks, most of the present senior personnel in teaching and S&T will be retiring in 5 to 10 years. It is therefore imperative that we create an environment for the top-notch talented people to rise to the top as soon as possible. The training of a group of young talents in advanced science and technology with current international standards should be approached as a strategic task.

The development of China's high-tech industry has taken place under reform and openness and the training of personnel has also been conducted in an environment of reform and openness. The training of S&T workers must pay attention to political thought education. We should help the students improve their ability to analyze and discriminate among the ideas of the western culture. The students should be taught the sense of group and patriotism so that they are familiar with the basic situation in China and become contributors to the socialist cause and supporters of the Party leadership.

Promote the Development of High-Tech Industry by Combining Teaching, Research, and Production

A major characteristic of research conducted by instructors in higher-education institutions is that their research is closely tied to the training of advanced specialists. Because of the intellectual challenge in high-tech development, it has become a good vehicle for advanced personnel training. The integration of high-tech research results into the instructional curricula has enriched teaching. The technical facilities used in high-tech research generally serve as good teaching facilities as well. There are 120,000 graduate students in the colleges and universities; they are carrying out an enormous amount of research under the guidance of their professors. These young students are at the age of creativity and they are the new blood in the universities. Their participation in high-tech development and, after their graduation, assignment to various jobs help technology transfer and dissemination of research results.

High-tech industry, high-tech research and the training of advanced technical personnel are three areas that complement each other. The development of high-tech production has posed new challenges to education, but the advances in high-tech also have provided a new means for information exchange and have strongly affected the development of education. Those institutes engaged in high-tech research and high-tech production have enjoyed the advantages of improved teacher quality and scientific instruction, enriched instructional programs, improved experimental facilities, more opportunities for students to participate in practice, and better student creativity. While training the students, advanced research is moved forward. On the other hand, the development of high-tech research and industry relies on the scientific and cultural aptitude of the population and the education and training of the students. To realize the goal wherein the training of graduate students is basically accomplished in China, we must establish a number of international-standard open-style teaching and research bases and post-doctoral stations. Today China is systematically building dozens of national laboratories and special-topics laboratories, and a number of nationwide post-doctoral-flow stations and engineering research centers. These open-style laboratories funded by the State will also be China's important research bases for high-tech development.

The Intellectual Support of Universities Is Important to the Development of High-Tech Industries

In foreign countries the participation in high-tech industrial development by the universities has been very successful. The establishment of Silicon Valley in California has benefited from the contribution of Stanford University, and the high-tech corridor along Route 128 near Boston cannot be separated from MIT. The Research Triangle in North Carolina is closely tied in with Duke University, the University of North Carolina, and North Carolina State University. Science parks being formed in England, Japan, Taiwan and Singapore are all closely connected to universities.

In the history of high-tech development, the intellectual support of universities has played an important role. In the development of computers, many new concepts and new technologies have come from universities. The first large digital computer was built jointly by Harvard University and IBM. The first electronic computer came from the University of Pennsylvania. Cambridge University in England developed the first computer that stored programs. Virtual memory was proposed and achieved in Manchester University in England. Time-sharing system, computer networks, PASCAL language and TEX language were also first realized in universities. In China the universities have also played an important innovation role in the development of microelectronics and computers. In the 1950's, the semiconductor physics

specialty jointly established by five universities succeeded in developing China's first transistor. In the 1960's the Harbin Institute of Military Engineering developed China's first transistorized digital computer, the 441B. Beijing University first developed the 1 Kb dynamic MOS memory, and Qinhua University and Beijing University collaborated in the development of the 4 Kb static MOS memory. In the 1970's Beijing University cooperated with the No. 738 Plant and the Ministry of Petroleum in the development of a computer capable of 1 million instructions per second (MIPS). In the 1980's the University of S&T for National Defense worked with other units in the development of the [first] 100 MIPS [super] computer. There are about 500,000 research and teaching staff in China's universities, out of these about 100,000 hold advanced technical posts. Full-time-equivalent scientists and engineers engaged in R&D number about 106,000. Together with 120,000 graduate students, the intellectual resources of China are very substantial indeed.

At institutes of higher learning there are both natural sciences and social sciences and a full complement of basic sciences and technical disciplines. The cross-pollination between the disciplines promotes the generation of new thoughts and concepts, and favors the solution of scientific problems in the high-tech fields by organizing a multidisciplinary force. Historically universities have a tradition for international exchange, which is very beneficial for fostering international cooperation in high-tech under the openness environment.

A high-tech industry needs the backing of a technical force. Universities and colleges produce 6000-7000 major research results every year and account for a big fraction of the three levels of national awards. The awards received by universities are respectively 22.2 percent, 29.5 percent, and 48.7 percent of the national S&T Advancement Awards, the Invention Awards, and the Natural Science Awards. In China's high-tech development plan (the civilian portion), about 40 percent of the projects are assumed by the universities. In the six national priority high-tech areas, there are 281 research institutes at universities, with more than 8000 people engaged in high-tech research; out of these, 1300 are professors and associate professors, and 3000 are graduate students.

High-tech industries are often the results of transforming frontier science research into products; it must be based on strong basic research and applied research. Universities and the Chinese Academy of Sciences have played the principal role in China's development of basic and applied research. In the fundamental research for professional industry, the universities are also playing a major role. For example, of the 141 tasks in the project called "Fundamental Theory and Experimental Development of Machines" under the formerly First Ministry for Machine-Building, 105 tasks were performed by universities.

Universities Are Establishing High-Tech Industries and Scientific Research Parks To Promote the Combination of Teaching, Research and Production

Innovation is an important endeavor and driving force for the development of high-tech industry. Universities have a distinct advantage in innovation. Therefore, in formulating China's high-tech industrial development strategy and plans to import foreign technology, attention should be given to the utilization of the innovative force at China's universities so that China may industrialize its own high-tech results and compete on the international market. Thirteen years ago when the development of Chinese-character typesetting systems was still in the first generation, researchers at Beijing University innovatively created an information compression and restoration system for character form. This innovative technique bypassed second- and third-generation photographic typesetting and proceeded directly to the fourth-generation laser photographic typesetter. Today Beijing University is developing the Huaguang computer laser typesetting system for Chinese characters in a consortium with the Weifang Computer Company, the Hangzhou Telecommunications Plan of the Ministry of Posts & Telecommunication, and the Changchun Institute of Optics and Fine Mechanics and the Kunlun Electronics Printing Equipment and Service Company in the Chinese Academy of Sciences. Today annual orders for the Huaguang VI system have reached 60 to 70 million yuan and the system is capable of competing with imported photographic typesetters. In cooperation with Weifang Computer Company, Beijing University has provided the company with three senior technical staff to serve as the Deputy Executive Director and Chief Engineer, the Director of the Weifang Institute for Computing and the project leader of the office automation project. Beijing University has also trained 40 graduate students and 30 software programmers for the company.

The effort of the universities to build high-tech business and research parks is an extension of the universities toward the economic arena and an important step in the reform of universities. It brought the needs of social and economic development into the schools and promoted reform in the education structure, the specialty organization, and the content and mode of education. It allowed the universities to produce technical and management talent that can more closely satisfy the needs of the industry.

In order to accelerate the promotion of technical results, the universities have also selectively started some technical enterprises. According to 1988 statistics, universities ran 598 enterprises. A survey of 16 schools showed that these schools have started 37 enterprises, including 19 companies started by the universities alone and 18 companies started jointly with outside units. One example is the urine kinase business developed by the Nanjing University biochemical plant; this business achieved a per-capita annual profit of 300,000 yuan and

has earned per-capita foreign exchange close to $300,000. The plant manager was awarded a superior entrepreneur gold medal.

In the past 2 years the State Education Commission has joined forces with Zhejiang Province and Changping County in Beijing to develop a university/high-tech experimental zone in order to exploit the technological know-how in the universities for faster economic development. The two places have each provided 20-million yuan-interest-subsidized loans as an incentive to involve universities in China for local economic development. The State Education Commission and the Province of Zhejiang have jointly developed high-tech experimental zones in Hangzhou, Jiaxing, Pinghu and Shaoxing in May, 1988. In the last 2 years local banks have provided 24.38 million yuan to 22 universities for the development of 48 projects in the experimental zones in Zhejiang; six of these projects have already earned foreign exchange. In addition, research parks and high-tech streets developed by universities in other regions have also played an important role.

Millimeter-Wave Key State Lab To Be Built

90P60022a Nanjing JIANGSU KEJI BAO in Chinese 27 May 90 p 1

[Article by Jian Feng [0494 1496], Zhu Fan [4554 4907] and Yue Gao [6460 0948]: "Southeast University To Build Nation's First Millimeter-Wave Key State Lab"]

[Summary] The construction-plan demonstration meeting (under the auspices ofthe State Planning and Education Commissions) for China's first millimeter-wave key state laboratory, to be built at Nanjing's Southeast University, has concluded. With advantages such as large bandwidth, good directionality, high resolution, and high resistance to jamming, this technology has been widely applied of late in areas such as accurate guidance, space communications, radar, satellite remote sensing, and radioastronomy. Southeast University is well positioned for the construction of this lab, since it initiated research into the theory and applications of microwaves and millimeter waves as far back as the fifties; by the early seventies it had set up a microwave/millimeter-wave integrated circuit (IC) technology room and begun to develop millimeter-wave solid-state oscillators, low-noise receivers, millimeter-wave transmitters, etc. Since then, the university has received seven national awards for its development of millimeter-wave ICs, which was based on research into the fundamental theory of millimeter waves.

Metrology Research Institute at World-Class Level

90P60022b Taiyuan SHANXI RIBAO in Chinese 20 Jun 90 p 3

[Unisgned article: "China's Metrology Research at World's Forefront"]

[Summary] Beijing, Jun 19 (XINHUA)—The Chinese Academy of Sciences' [CAS] Metrology Research Institute, whose scientists have conducted studies in length, thermodynamics, mechanics, electromagnetism, ion radiation, radio, time frequency, optics, acoustics, and chemistry since the institute's establishment in 1965, has recently advanced to the world's forefront. Institute President Zhao Kegong revealed that in the scale of its facilities and effort, the institute ranks third or fourth in the world, and in level of research fourth or fifth in the world.

Especially noteworthy achievements are the institute's R&D of frequency-stabilized lasers; applications of laser technology; development of six types of simultaneous-emission visual-wavelength continuous-wave [CW] helium-neon lasers (a world first); and its independent design and fabrication of low-noise, high-power, high-reliability measurement-benchmark laser diodes, 44 of which have been exported to the U.S., the FRG, Italy, France, and eight other countries. In cooperation with Beijing University, the institute has actively developed YBaCuO high-temperature superconductors and superconducting quantum interference devices [SQUIDs]. The institute currently has 1033 scientists and engineers, including almost 300 at the level of assistant researcher of higher (up to senior technical specialist).

Enrollment, Subjects, Achievements, and Facilities at Various Defense and Aerospace Universities and Institutes

90FE0161A Beijing HANGKONG ZHISHI [AEROSPACE KNOWLEDGE] in Chinese No 5, May 90 pp 10-13, 11

[Excerpt]

PLA University of Science and Technology for National Defense (USTND)

The PLA USTND is a science and engineering college for training highly qualified and specialized personnel for the armed forces; it is one of the nation's key universities, and also one of the first colleges that offered a graduate program. Its predecessor was the military engineering institute established in 1953 in Harbin City. The current school site is in Changsha City in Hunan Province.

The university has nine departments for four research institutes: the Aerospace Technology Institute, the Applied Physics Institute, the Electronics Technology Institute, and the Electronic Computer Institute. The university was one of the first schools approved by the State Council to offer Bachelor's, Master's and Doctor's degrees. It offers 25 different specializations for its regular students; also, 29 disciplines have a Master's degree program and 10 disciplines have a doctoral program. It has a post-doctorate mobile research station which is engaged in two specialized research activities; it also has 39 classrooms and 24 research offices.

The school currently has an enrollment of more than 4000; it employs over 1600 teachers and researchers, 510 of whom have the rank of associate professor or higher. The school frequently sends its teachers and graduate students abroad to inspect, to study, and to participate in international academic activities; it also invites many foreign professors and scholars to give lectures or to take part in academic exchanges with Chinese scholars. A number of foreign teachers have been invited to be resident professors at the school. The school has accepted and completed a large number of research tasks; since 1978, it has won more than 700 awards for research achievements at the national, ministry, provincial and municipal levels. It has made important contributions in such major scientific tests such as the test of launch vehicles in the Pacific, the underwater test of launch vehicles, and the launch of geosynchronous communications satellites. Following the development of the Galaxy 100 MIPS supercomputer, the school has completed numerous research projects including the first all-digital simulation computer, the Galaxy superminicomputer, an advanced display and processing system, a

prototype laser gyroscope, silicon carbide fiber, a multiple re-start liquid bipropellant variable-thrust rocket engine, the "Weaver Girl-1" sounding rocket, a two-legged walking/climbing robot, an armed forces troop-structure dynamic analysis system, and the dynamic inspection and control unit for precision machine tools. Among the graduates of the University, most have become key members of the technical force devoted to defense modernization; many are in leadership positions at government offices, General Staff Headquarters units, armed forces units, research organizations and military schools.

With the approval of the Central Military Commission, this university has been classified as a military college, which will apply the admission rules and regulations for military schools in admitting new students (except for specially assigned students), and will be eligible to participate in the early admission program designed for military colleges. Applicants to the University must be subject to political investigations by the Ministry of Public Security, the General Staff Headquarters, and the General Political Department; they must also pass physical examinations in accordance with the standards established for PLA military schools. New students who have been accepted by the University can start enlistment procedures by showing the "enlistment certificate for local military students" issued by the General Staff Headquarters and the General Political Department, and cancel their local registration cards. During the school years the students can enjoy the privileges of military personnel (and their dependents can enjoy the privileges provided for dependents of military personnel). After graduation, the students are likely to be assigned to the following types of jobs: research and design positions in research units of the armed forces; teaching positions in military schools; technical positions connected with the testing, production, maintenance and operation of weapons and military equipment; and technical command and management positions in military organizations.

The 1990 new enrollment for the different disciplines and the curriculum are as follows: aerospace technology (4-year)—45; applied physics (4-year)—30; automatic control (4-year)—85; electronics technology (4-year)—100; materials engineering (4-year)—25; electronic computers (4-year)—100; applied mathematics (4-year)—25; systems engineering (4-year)—50; mechanical and electronic engineering (4-year)—30; measurement technology and instrumentation (4-year)—30. The enrollment of female students for all above disciplines is approximately 20 percent. The 1989 test scores of new students admitted to the University by province are as follows: Jiangsu 605-572, Anhui 603-549, Zhejiang 607-555, Fujian 604-563, Shandong 617-580.

PLA NDCSTI School of Command Techniques

The PLA School of Command Techniques under the National Defense Commission of Science, Technology & Industry (NDCSTI) is an integrated military college for both mid-level command and advanced technology. It was established by NDCSTI to train command and management personnel as well as advanced engineering and technical personnel for test programs of strategic and conventional weapons and for aerospace test systems.

The Institute policy requires its students to be conservative, practical, dedicated, unselfish, and to follow the fundamental principles of the Communist Party. Its goal is to educate and produce young military officers who have high moral and cultural standards, and who have the discipline and spirit as well as the technical capabilities to devote their energies to national defense.

The Institute has four departments: the Test and Command Department, the Electronic Engineering Department, the Measurement and Control Department, and the Electronic Computer Department. It offers courses at three different levels: special college courses, major courses, and graduate courses. The different specializations are designed with emphasis on research and tests for national defense. The test and command specialization provides a general background in command and management for research and testing. It emphasizes applied sciences and computer applications, and covers the basic concepts of modern command and management techniques; it also provides training in automate command, communications and control procedures and in complex command and management techniques of large-scale command and test projects. The technology specialization provides a general background in missiles and satellites, measurement and control systems for nuclear and conventional weapons systems, and communication systems; it offers the following special fields of study: computer applications, communications engineering, aerospace measurement and control engineering, radio telemetry and remote control, satellite communications technology, optoelectronic measurement, automated testing and instrumentation, and mechanical and electronic engineering.

The Institute has three centers: the center for experiments, the computing center, and the electronic education center; it also has a number of specialized laboratories. It has more than 100 computers of various types and over 3000 electronic instruments; it also possesses such modern equipment as radio telemeters, optoelectronic tracking devices, radars, stored-program-controlled [telephone] exchanges, digital communications equipment and satellite communications earth stations. The electronic education center is equipped with advanced video and audio equipment and special classrooms for language and voice instructions; it also has a closed-circuit educational television network which can simultaneously broadcast multiple channels of color TV programs. The library has a storage capacity of 270,000 books and more than 1,100 foreign and Chinese journals; it has five reading rooms with 400 seats. The second phase of library construction is also near completion.

The Institute has assembled a team of highly qualified and experienced teachers who are dedicated to education; currently, it employs more than 80 professors, associate professors and other high-level technical staff. The Institute insists on a policy centered around teaching; its research and teaching activities are closely coordinated. The research programs of the Institute are designed to proved services for teaching, defense construction and economic development. Currently, its primary research activities are in the area of microelectronics; it has completed the computer network design project for the 6th All-China Games and a number of network design tasks for the 11th Asian Games.

The Institute is located in a suburb of Beijing, with a view of the Mu Tian Gu section of the Great Wall and Yanxi Lake. The beautiful natural surroundings provide favorable conditions for the academic and cultural activities of this Institute. We urge young people planning a career in science and technology for national defense to submit your applications to this Institute so you may have an opportunity to contribute your talents to the modernization of our defense industry.

The 1990 enrollment according to specializations and curriculum are as follows: aerospace measurement and control engineering (4-year)—30; communications engineering (4-year)—30; computer applications (3-year)—30; automated testing and instrumentation (3-year)—30. The enrollment of female students among these specializations is 15 percent. The 1989 test scores by province are: Shanxi 547-492; Sichuan 585-494.

The Doors of Aerospace Universities and Institutes Are Open to China's Youths

In order to meet the demands for engineers and technical personnel to develop China's high-technology industries, six higher institutions of the Ministry of Aeronautics & Astronautics Industry, which include Beijing Aerospace University, Northwest Polytechnical University, Nanjing Aeronautical Engineering Institute, Shenyang Aeronautical Technology Institute, Nanchang Aeronautical Technology Institute and Zhengzhou Institute of Aeronautical Technology and Management, will admit 5216 new students this year from the participants of the national unified examination to be held at 29 locations around the country. Of these new students 4851 are admitted under the State mission plan; 229 are admitted on consignment, and 136 are self-financed students. Emphasis of the recruiting program of the six schools will be placed on aeronautics and space, and on meeting the society's needs.

The main curriculum of the six higher institutions is centered around engineering and supplemented with courses in physical sciences, management science and liberal arts; there are 70 different specializations and 113 sub-specializations. In addition to the familiar specializations such as space travel, aircraft, aircraft propulsion, automatic control, electronic engineering, mechanical design, and electronic computers, a number of new business-oriented specializations such as management engineering, industrial foreign trade, industrial and residential architecture, accounting and public relations have also been implemented. In order to provide the students with a solid foundation as well as a versatile background, the institutions have devoted significant effort toward optimizing their administrative organizations, re-prioritizing the specializations, and strengthening the fundamental and foreign-language courses.

Most of the students admitted under the State mission plan will be assigned to State-operated aviation or aerospace organizations after graduation; a small number will be recommended for graduate studies. A majority of these organizations are located in large cities such as Beijing, Shanghai, Shenyang, Harbin, Xian and Chengdu.

To meet the demand for engineers and technical personnel in rural areas such as Guizhou province, Gansu province, and certain regions of Shaanxi province, Sichuan province, Hunan province and Hubei province, the institutions have implemented a policy of recruiting "pre-assigned students". Pre-assigned students enjoy a 20-point lower admission standard; they are also exempt from paying tuitions or fees, and receive a scholarship of 500 yuan per year. After graduation, they are assigned to the organizations specified in the contract.

In order to allow more students to have the opportunity to study at the aerospace universities and institutions, the schools also provide an admission plan for self-financed students who pay all the education expenses. After graduation, they can either choose their own job assignments or request the school for recommendations.

The higher institutions of aerospace are primarily established to train advanced engineering and technical personnel. They are different from civil aviation or military schools in that there are no special requirements on physical conditions; the physical examination standards are the same as those for ordinary engineering schools.

Three of the six institutions—Beijing Aerospace University, Northwest Polytechnical University and Nanjing Aeronautical Engineering Institute—are among China's key universities. They all have long histories and are equipped with first-class instructional, experimental and research facilities; they also have a strong teaching staff and provide full-service living quarters.

The aerospace universities and institutes have already made, and will continue to make, important contributions to China's aviation and space industry. Today's satellites, rockets and airplanes are all products of the brains and labor of graduates from these institutions. Now, the institutions are extending their welcome to a new generation of youths who have the desire to conquer space in the future.

1990 Enrollment and Curriculum of Aerospace Universities and Institutes Under the State Mission Plan

Beijing Aerospace University

Materials science and engineering: 100, electronic engineering: 85, automatic control: 40, detection technology and instrumentation: 25, hydraulic transmission and control: 25, electrical technology: 130, aircraft power engineering: 110, aircraft design: 50, engineering mechanics: 40, aircraft environmental control and safety: 30, computer science and engineering: 90, mechanical engineering: 165, welding technology and equipment: 25, management engineering: 30, industrial foreign trade: 60, applied mathematics: 25, mechanical design and manufacturing: 80, ideological and political education: 15, English: 40, systems engineering: 20, power plant: 85.

Northwest Polytechnical University

Applied mathematics: 20, engineering mechanics: 20, mechanical design and manufacturing: 134, detection technology and instrumentation: 36, applied electronic technology: 25, heat power machines and equipment: 27, mechanical production engineering: 27, industrial automation: 28, materials science and engineering: 121, polymer materials and engineering; 29, aircraft department: 115, electronic engineering department: 69, aircraft engines and heat-power engineering department: 121, engineering; 91, automatic control department: 85, electrical technology: 31, aircraft production engineering: 52, mechanical manufacturing techniques and equipment: 75, computer science and engineering department: 76, management department: 40, architecture: 20, industrial and residential architecture engineering: 29, applied physics: 20, ideological and political education: 30.

Nanjing Aeronautical Engineering Institute

Aircraft engineering: 152, aircraft power engineering: 105, electrical technology: 70, automatic control: 138, electronic engineering: 90, mechanical engineering: 235, industrial management engineering: 30, computer science and engineering: 95, accounting: 25.

Shenyang Aeronautical Technology Institute

Computers and computer applications: 25, radio technology: 25, aircraft production engineering: 100, engines: 30, mechanical manufacturing techniques and equipment: 65, mechanical design and manufacturing: 65, safety engineering: 23, industrial prototype design: 17.

Nanchang Aeronautical Technology Institute

Casting: 35, forging techniques and equipment: 60, welding technology and equipment: 35, metallic materials and heat treatment: 30, corrosion and protection measures: 55, environmental engineering: 30, mechanical manufacturing techniques and equipment: 110, nondestructive testing: 40, electronic instrumentation and measurement techniques: 45, physics (teaching): 20, industrial analysis: 20, English: 15.

Zhengzhou Institute of Aeronautical Technology Management

Industrial accounting: 140, planning statistics: 101, materials management: 65, scientific and technical archiving: 34, labor financial management: 33, public relations: 24, mechanical manufacturing techniques and equipment: 78.

[Passage omitted]

Impact of Space Technology on the National Economy Reviewed

90FE0180A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 25 Apr 90 p 1

[Report by Wang Hanlin [3769 5060 2651]]

[Text] To commemorate the 20th anniversary of the launch of China's first satellite, a "Symposium on Space Technology and National Economic Development" was sponsored in Beijing by the Chinese Astronautics Society and attended by more than 200 aerospace experts. A unanimous opinion of the experts is that aerospace technology plays an important role in the nation's economic development and in accelerating China's four modernizations programs.

Dr. Ren Xinmin, technical consultant to the Ministry of Aviation and Aerospace and chairman of the board of the Chinese Astronautics Society, pointed out: "Over the past 20 years, China has launched 27 earth satellites using its own launch vehicles; it has achieved major breakthroughs not only in launch technology but also in the technology of satellite retrieval and positioning. It has acquired the capability of launch satellites into low-earth orbits, sun-synchronous orbits, and geosynchronous orbits." He believes that we should make full use of the technologies already developed to explore the space resources for the benefit of economic development of this country. Prof. Wang Xiji, who is a member of the International Academy of Space Science, said: "As a developing country, aerospace technology provides a short cut for developing China's economy. The advancement in aerospace technology will stimulate research and development in many other areas of science and technology. For example, China's modern capabilities in long-distance communications, weather forecasts, and general surveys of earth resources are closely tied to the development of its aerospace technology."

The director of China's Space Technology Research Institute, Min Guiren, said: "China loses as much as 50 billion yuan per year due to natural disasters; it also suffers losses from bottlenecks in transportation and in funds transfer. The solution to these problems also depends on space technology. If we could save one-tenth of these losses, it would be a sizable sum." Rocket expert Huang Weilu commented: "Aerospace technology plays a leading role in promoting economic development. For example, in the United States, the Apollo project provided the driving force for scientific and technological advancement across all industries."

Deputy director of the No. 2 Institute of the Ministry of Aviation and Aerospace, Xu Maining, said: "Aerospace technology is the culmination of all modern high technologies. In recent history, the development of science and technology generally follows a single leading technology. In the 1930's and 40's, the automative industry played a leading role; in the 1940's and 50's, the aircraft industry was the leading industry; after the 1950's and 60's, the leading industry has been driven by missile, atomic bomb, and aerospace technologies. Therefore, using aerospace technology to promote broad development in science and technology, which in turn propels the nation's economic development, is an essential path for a developing nation."

Member of the Science and Technology Committee of the Ministry of Aviation and Aerospace, Zhang Luqian, and researcher from the Aerospace Engineering Institute, Mei Xiangyen, said: "The development of China's aerospace industry has provided an invisible force which unites the Chinese people within China and overseas; this force cannot be measured in economic terms."

The experts agree that today's high standards of China's aerospace technology reflects the importance placed by the Party and the State on the aerospace industry; it also illustrates the superiority of the socialist system and the spiritual power of self-reliance, determination, and cooperation. They hope that future development of the aerospace industry will continue to receive the support from all segments of the society in order to provide the driving force for achieving modernization of China's industries, agriculture, science and technology, and national defense.

Chairman of the Defense Science and Engineering Committee, Ding Henggao, also spoke at the symposium.

Aerospace Industry Facing Talent Shortage

90FE0180B Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 14 May 90 p 2

[Report by Zhang Jiangang [1728 1696 0474]]

[Text] In an effort to correct a shortage of scientists and engineers, the No 3 Institute of the Ministry of Aviation and Aerospace outlined in April a "Plan for the Development of Scientific and Technogical Talents for the Year 2000," which is designed to stimulate the production of scientific and technical talents by changing the structures of technical organizations and implementing new policies over the next 10 years.

In order to maintain high technical standards and to ensure a continuing supply of technical talents, the Institute plans to enroll a certain number of specialized talents into the higher institutions each year, to assign a portion of older generation aerospace personnel to devote their energies to education, and to establish a system which will provide a favorable environment for the young talents. To accomplish these goals, the Institute has proposed the following specific measures: 1) to require each team of technical personnel working on future missile research and development projects to have no less than one-third of its staff under 35; 2) to require each team of mid-level officers to have at least one-third of its staff under 40 during the Eighth 5-Year Plan; 3) to establish a "key scientific team" and a "key management team" by cultivating and promoting young talents with outstanding performance; 4) to provide opportunities of

advanced training and studies abroad for specially talented young technical and management personnel; 5) to establish a "special fund for youth development" to reward young workers with outstanding performance and teachers who have made unique contributions to the development of young talent.

To ensure effective implementation of the plan, the Institute has decided to accelerate reforms of the personnel management system and to incorporate talent development and continuing engineering education as part of the contracts for all its subordinate factories and offices; it has also implemented scientific management techniques to achieve positive feedback in the development of a talented scientific research team.

New Generation of Satellites To Be Launched in Eighth 5-Year Plan

90FE0149B Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 30 Apr 90 p 1

[Article by reporter Wang Hanlin]

[Text] It has been learned from the recently concluded symposium on aerospace technology and economic development that the research and development work of China's new generation of satellites and launch vehicles are proceeding smoothly; currently, most projects have already entered the engineering phase, and the launch dates for the new satellites are expected to be during the period of the "Eighth 5-Year Plan." The number of applications satellites for that period will increase significantly over that of the 1980's, and the capability of the satellites to transmit information will increase many fold.

According to knowledgeable sources, the new-generation applications satellites currently under development include: the earth resources satellites, the Dong Fang Hong-3 communications and broadcast satellites, and the Feng Yun-2 geostationary weather satellites.

The earth resources satellite is a joint development effort between China and Brazil. The new satellite will have an expanded capability compared to the two existing domestic resource surveillance satellites; specifically, it will be designed to perform long-term and periodic surveillance of earth resources such as soil conditions, total area of cultivated land, and mineral reserves. It can cover the entire earth in 18 days, and can be re-oriented to conduct special surveillance. The satellite contains 10 frequency bands covering the visible light and infrared spectrum, and is considered to be one of the most sophisticated satellites in the world today.

The Dong Fang Hong-3 communications and broadcast satellite has 24 transponders and a design life of over 8 years; thus, its performance will be superior, to that of China's five existing communications satellites in terms of capacity and life span.

The Feng Yun-2 weather satellite will be injected into a geosynchronous orbit where it can cover the Chinese landmass and surrounding regions. The satellite will carry a multi-channel high-resolution scanning radiometer which can provide high-quality cloud maps and meteorological data, and issue timely reports on abruptly developed weather phenomena. It greatly enhances China's weather forecasting capability.

In addition, a number of satellite application systems closely related to economic development are also under development.

In the second half of this year, three of China's satellites will be launched. They are: China's 12th retrievable remote-sensing satellite, to be launched by the Long March-2 booster; the Feng Yun-1 weather satellite to be lofted by the Long March-4 launch vehicle; and an experimental satellite to be launched by the newly developed Long March-2E launch vehicle.

Large Spacecraft Simulator Training Facility Now Operational

90FE0149A Beijing GUANGMING RIBAO in Chinese 29 Apr 90 p 1

[Article by reporters Liu Jingzhi and Yu Cuiming]

[Text] As part of the research and development programs of the "Seventh 5-Year Plan" for all the Armed Forces a "large spacecraft simulator training facility" was developed by the Command Technology Institute of the National Defense Commission of Science, Technology and Industry. This facility, which is now operational, represents another one of China's major achievements in aerospace technology.

In the past, the training of aerospace testing and command personnel relied primarily on the pre-launch integrated exercises and "on-the-job" training during launches. This approach had encountered many difficult problems. To solve these problems, the Command Institute organized a team of 22 teachers and researchers who spent over 3 years designing and building China's first training facility, which includes a target test range and a spacecraft flight simulator.

The object of simulation for this system is the launch operations of the Dong Fang Hong-2 geosynchronous communications satellite. By using graphics, words, sound and visual images, the system simulates the process of ground testing and inspection, launch and lift-off and orbital flight of the spacecraft as well as the operational parameters accurately and realistically. It creates a nearly authentic environment for space testing and command, and provides a satisfactory solution to the problem of training aerospace command personnel.

Aerospace Vice Minister on Launch Services Policy

90FE0149C Beijing JINGJI RIBAO [ECONOMIC DAILY] in Chinese 10 Apr 90 p 1

[Article by reporter Ke Dong]

[Text] In a news conference given by Vice Minister Liu Jiyuan after the successful launch of the "Asiasat-1" communications satellite, he reiterated China's policy on developing its capability to provide launch services to the outside world. He said: "The primary objective of developing aerospace technology in China is to satisfy the needs of domestic modernization; however, China also wishes to join other countries of the international community in exploring outer space for the benefit of mankind."

Liu pointed out that the launch services China provides are a beneficial supplement to the international launch market, and that it has no intention of becoming a competitor—and certainly not a "threat"—to the rocket manufacturers in Europe or America. China has a limited launch-vehicle production capability and limited launch facilities; therefore, China's launch services will only provide another launch option for the foreign customers.

In response to the concerns expressed by some foreign customers about the "technology security" of satellites to be launched in China, Liu emphasized that the Chinese government has repeatedly declared that it has no intention of stealing any technology secrets from the foreign satellites. The recently launched "Asiasat-1" communications satellite was shipped from the United States to Beijing in February of this year, then transferred to the Xichang Launch Center. During the period from entrance of this country to launch, the satellite had been under constant custody of U.S. personnel; thus, technology security of foreign satellites was assured.

When asked about the cost of the launch services, Liu said: "The Great Wall Industrial Corp. is a trade organization of the Ministry of Aeronautics and Astronautics Industry. The main reason it can offer launch services to its customers at competitive prices is that the Chinese-designed launch vehicles are reliable and have a very high launch-success rate; they use primarily domestic materials and components, which are considerable cheaper than those sold on the international market; also, China's labor cost is much lower. However, we would never quote a price lower than the cost, and the Chinese government would never subsidize the Great Wall Corp. Furthermore, according to international tradition, when China first entered the international launch-service market, it was obligated to provide favorable services to its customers.

Finally, Liu said: "Because of the high cost and high risk associated with launching a satellite, the customer generally wants to obtain launch insurance; to honor such requests, a Chinese insurance company was set up to provide the launch insurance for the last launch. Looking toward the future, we should continue to develop China's aerospace technology and to provide better launch services for our foreign customers."

Measures for Reaching Strategic Goals Discussed

Introduction

90FE0150A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 28 Apr 90 p 1

[Article by Zhang Xiaoyuan [1728 2556 0626]: "Progress in Measures For Reaching Strategic Goals in the New Materials Arena"]

[Text] Chengdu, 27 Apr—New achievements have been made in measures for reaching strategic goals in the new materials arena—an important component of China's high-tech strategic plan. This news is obtained from the collective report session on the new materials arena strategic goals as part of the high-tech research plan. China's new materials research plan has gone through 3 years of implementation. Within the "Seventh 5-Year Plan" 96 percent of the planned research work in this arena has been completed. Certain items have reached international standards, and new breakthroughs have been made. Recently, Chinese inventions, the BBO and LBO crystals received the "Industrial Achievement Award" of the 1990 "International Laser Prizes." Highly pure and fine Si02 glass continuous fibers have filled a vacuum within China, and have had a good beginning. Pyrolytic CVD [chemical vapor deposition] treatment has produced even polycrystalline diamond films with diameters of 30 to 50 mm, thereby reducing the distance between Chinese and international achievements. Strengthening agents used in advanced composite materials research are gradually being supplied form within China. Key materials needed in producing optoelectronic information materials—metal-organic compound materials have already begun to be supplied in small amounts from within China. Metal-based and ceramic composite materials have respectively been tested in diesel pistons and metal cutting tools. Various centers and bases of "The National Artificial Crystal Consolidated Research and Development Center" are under construction.

Mr Song Jian [1135 0256], Member of the State Council and other leaders from related departments attended this meeting.

New Materials Area Stressed in 863 Plan

90FE0150B Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 28 Apr 90 p 1

[Article by KEJI RIBAO staff: "New Materials: the Basis and Prerequisite of Technological Advances"]

[Text] The development of human society proves that materials are the material basis and prerequisite of technological advances. High-tech advances nowadays are especially dependent on the development of new materials. For example, in the early seventies, when the optical losses of quartz optical-fiber materials was reduced to 20 decibels per kilometer, and when laser materials that can operate at room temperatures appeared, optical communications technology then blossomed and developed quickly and rapidly became an enterprise. At present, research and development on superfine glass optical waveguide fibers, semiconductor materials whose layers are only a few atoms thick, and other new optoelectronic materials will lead to a revolution in information technology. Optoelectronic technology developed on these materials will represent the characteristics of new industries in the twenty-first century.

The new materials area's research scheme in the "863" plan is mainly concerned with the spirit of "aiming at the cutting edge and following diligently" and "limiting targets and highlighting key points". This area's main title is "key new materials and modern materials science and technology". High-tech and other main areas supported by key new materials include information technology, aerospace technology and energy technology among others. Special topics in this area of research occupy two thirds of the whole area. Special topics in modern materials science and technology occupies one third of the research.

Song Jian Comments

90FE0150C Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 1 May 90 p 1

[Article by Zhang Xiaoyuan [1827 2556 0626]: "Song Jian [1135 0256] Speaks on the "863" New Materials Area Strategy Collective Report: "China's Traditional Industries Have To Be Revamped by New High-Tech"]

[Text] Chengdu, April 30—"China's economic development depends on science and technology, and the spread of high-tech continuously into industries. Otherwise China can only expect to fall behind other countries. Chinese ceramics were the hallmark of the development of China's science and technology in ancient times. However, in the last few centuries, porcelain has remained at the lowest level of ancient labor. On the other hand, after learning China's porcelain technology, and adding new technologies, Western nations have now passed China by." The above statements were made by Song Jian, Member of the State Council and Chairman of the State Science and Technology Committee, who spoke at the closing of the "863" New Materials Area Strategy Collective Report session.

He said that China has to decisively change the present situation, reinforce the involvement of enterprises in new materials, and enforce the application of one percent of gross income in the development of technology. In addition, he said that China needs to strengthen the establishment and perfection of development firms, increase the development ability and level of technological personnel, move large and medium-sized enterprises toward high-tech development, start high-level development firms, and finally, start producing high-level new materials.

Song Jian said that the ten-year period of reform and openness has elevated China's production level. We have to grasp the development and mastery of new production technology in order to provide China's major industries with powerful support. This is China's present situation. This opportune time of treatment and reorganization should be fully utilized. In the "863" plan, China's high-tech development should play a leading role. New technology should be used to reform its traditional production industries.

Zhu Lilan [2612 7787 5695], the vice chairperson of the State Science and Technology Committee, and Zhu Guangya [2612 0342 0068], chairperson of the National Defense Commission of Science, Technology and Industry also spoke at the report session.

Grain-Boundary Structures in PLZT Ceramics

40090021B Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE CERAMIC SOCIETY] in Chinese Vol 18 No 2, Apr 90 pp 187-190

[English abstract of article by Song Xiangyun [1345 4382 0061] et al. (Shanghai Institute of Ceramics, CAS) (MS received 28 Apr 89)]

[Text] Some possible atomic structural models of the grain boundary in PLZT [lead lanthanum zirconate titanate] transparent ferroelectric ceramics were constructed according to the HREM image photomicrographs taken near the grain boundary by using a high-resolution electron microscope. These models not only give a clear picture of the grain-boundary structure in PLZT ceramics, but can also be used as a reference for grain boundary research of other ceramics with similar structure.

Key words: ferroelectric ceramics; grain boundary; structural models

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Study on the Strengthening of SiC-ZrB_2 Multiphase Ceramics

40090021A Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE CERAMIC SOCIETY] in Chinese Vol 18 No 2, Apr 90 pp 123-129

[English abstract of article by Jiang Dongliang [3068 2639 0081] et al. (Shanghai Institute of Ceramics, CAS) (MS received 15 Mar 89, revised 24 Jul 89)]

[Text] The effects of second-phase particles and changes of ZrB_2 contents on strength and toughness of SiC-ZrB_2 multiphase ceramic were studied. Oxidation behaviour of SiC-ZrB_2 was determined. Microstructure and fracture behaviour of multiphase ceramic were examined and analysed by metallography, TEM and SEM. It is pointed out by experimental results that properties of the material are not only dependent on the composition but also on the processing condition.

For the optimum hot-press condition, fracture toughness of SiC-15 vol.% ZrB_2 is about 6.5 MPa x $m^{1/2}$ which is about 50 percent higher than that of HP-SiC. Bending strength is still up to 560 MPa. Compared with HP-SiC, oxidation resistance of SiC-15 vol.% ZrB_2 increased greatly at 1280°C. For the sake of safety, the temperature should be lower than 1150°C.

Analysis of toughening mechanism indicates that crack branching and bowing may contribute to the increase of toughness through crack propagation observed on the polished surface after indentation and SENB test.

Key words: SiC-ZrB_2 multiphase ceramic; hot-press; particle strengthening; toughening; oxidation resistance

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Synthesis of 2-Methyl-5-Substituted Phenoxy-Primaquine and Antimalarials Activity

40091013F Beijing YAOXUE XUEBAO [ACTA PHARMACEUTICA SINICA] in Chinese Vol 25 No 3, Mar 90 pp 167-172

[English abstract of article by Zhong Bohua [0112 0130 5478], Deng Rongxian [6772 5554 0103], et al., Institute of Microbiology and Epidemiology, Academy of Military Medical Sciences, Beijing 100850]

[Text] In searching for efficient, safe and radically curative agent and causal prophylactics for malaria, seven 2-methyl-5-substituted phenoxy-6-methoxy-8-(1-methyl-4-aminobutylamino)-quinolines (II_{1-7} were synthesized and their antimalarial activities were compared with the corresponding 4-methyl substituted derivatives of primaquine.

The starting material, 2-nitro-4-methoxy-5-bromo-acetanilide (III), was prepared from p-methoxy aniline through acetylation, bromination and nitration. III was then condensed with substituted phenols in the presence of potassium carbonate. The condensed products were subsequently hydrolyzed with dilute alcoholic hydrochloric acid to yield 2-nitro-4-methoxy-5-substituted phenoxy-aniline (V) which underwent Skraup's reaction with 2-butenal to provide the key intermediates 2-methyl-5-substituted phenoxy-6-methoxy-8-nitroquinolines (VI). These 8-nitroquinoline derivatives were reduced to 8-aminoquinoline derivatives (VII). The latter were condensed with 4-bromo-1-phthalimido-pentane and then hydrolyzed with hydrazine hydrate, the final products were obtained as oxalate or succinate. The structure of the target compounds and unknown intermediates were confirmed by elementary and spectral analysis.

Primary biological evaluation showed that all compounds II_{1-7} were much less active than the 4-methyl substituted derivatives and slightly less active than primaquine in both causal prophylactic test against Plasmodium yoelii and suppressive antimalarial test against P. berhei.

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Studies on Biological Tissue Electrode Sensitive for Catechol

40091013D Shenyang FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 18 No 4, Apr 90 pp 315-319

[English abstract of article by Shen Guoli [3088 0948 0536], Chen Guangyan [7115 0342 3543] et al., Department of Chemistry and Chemical Engineering, Hunan University, Changsha, 410082; Xie Jinyun [6200 6930 0061] and Zhang Meifen [1728 2734 5358], Department of Biology, Hunan Normal University; project supported by the National Natural Science Foundation of China]

[Text] A tissue section electrode sensitive to catechol has been made with a thin slice of potato coupled with an oxygen electrode. The dynamic response of electrode is linearly related with the concentration of catechol over the range of 2.2-88 μg/ml and the correlation coefficient is 0.9998. Important experimental variables including the effect of buffer composition, operation pH, temperature, tissue slice thickness and immobilization of enzyme in the tissue were investigated. The reproducibility, selectivity and lifetime of tissue membrane electrode were determined. The Michaelis constant of enzyme reaction at present condition was calculated. The average recovery for 10 samples determined by the dynamic response method was 100.2 percent with a standard deviation of 1.07 percent.

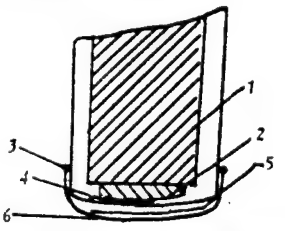

Figure 1. Dissection of Electrode

Key: 1. Silver plate 2. gold plate 3. Rubber band 4. Oxygen-transport membrane 5. Potato slice 6. Nylon net

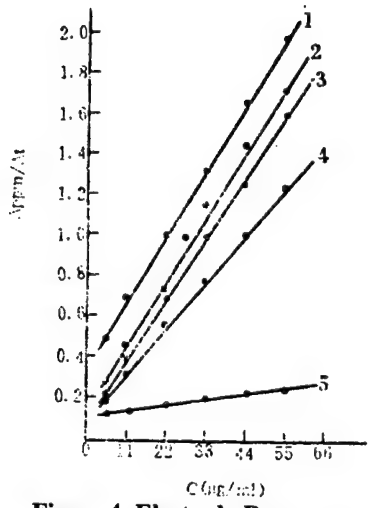

Figure 4. Electrode Responses

Key: 1. One day 2. Two days 3. Three days 4. Four days 5. Six days

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Effect of Artesunate Transdermal Preparation on Plasmodium Cynomolgi

40091013H Beijing YAOXUE XUEBAO [ACTA PHARMACEUTICA SINICA] in Chinese Vol 25 No 3, Mar 90 pp 220-222

[English abstract of article by Xuan Wenyi [1357 2429 3354], Zhao Yi [6392 0001], et al., Guangxi College of Traditional Chinese Medicine, Nanning 530001, and Liu Xu [0491 2485], Guilin Pharmaceutical Factory, Guilin 541002]

[Text] Artesunate transdermal preparation of 5, 10, or 15 mg/kg, bid, for 3 days applied locally on the shaved skin of the back of monkeys showed reliable therapeutic effects on Plasmodium cynomolgi,but recrudescence of the parasites was not controlled. If some azone was added in the artesunate transdermal preparation at the dosage or 5 mg/kg, bid, for 3 days, the parasitemia of Plasmodium cynomolgi could be cleared and recrudescence prevented, thus, the antimalarial effects were enhanced.

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Construction of Plasmid Vectors Expressing Unfused Proteins With High Efficiency in E. coli

40091013A Beijing BEIJING YIKE DAXUE XUEBAO [JOURNAL OF BEIJING MEDICAL UNIVERSITY] in Chinese Vol 22 No 2, Apr 90 pp 81-83

[English abstract of article by Ma Dalong [7456 1129 7893], Lao Zhege [0525 5074 2960] et al., Department of Immunology]

[Text] A new series of plasmid vectors pKPL was constructed by DNA recombinant techniques. These vectors express unfused proteins with high efficiency in E. coli. They contain the initiator ATG, the multiple cloning sites (MCS) and rrnB terminator. The plasmid pLCAT-3, which was derived from pKPL-2 D, synthesizes chloramphnicol acetyltransferase (Cat) more than 30 percent of the total cellular protein. In addition, the pKPL series was successfully used for expressing human interleukin-3 (IL-3) and GM-colony stimulator (GM-CSF) with biological activities.

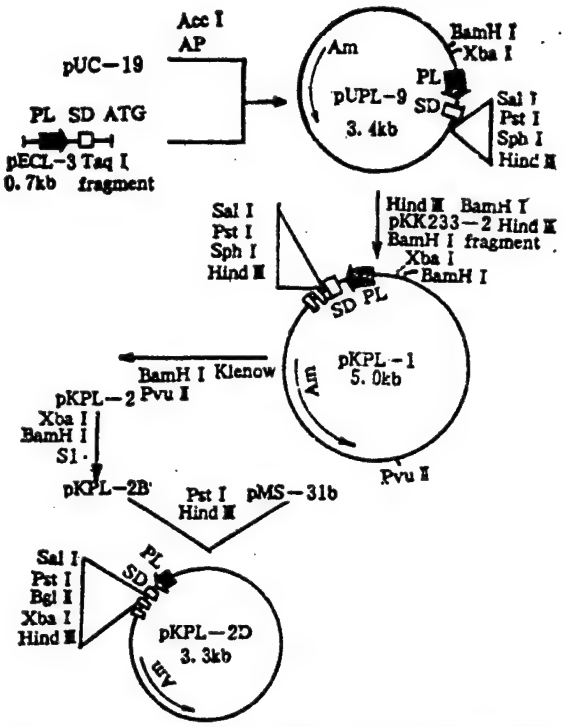

Figure 1. Construction of pKPL Expression Plasmid

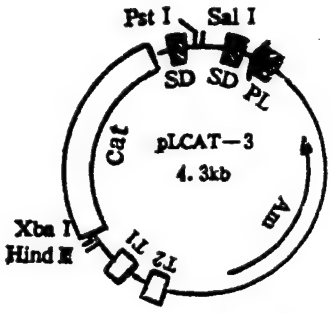

Figure 2. Map of pLCAT-3 Plasmid

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The Application of Stepwise Discriminant Analysis in the Classification of Plasmodium Blood Smear

40091013I Beijing SHENGWUHUAXUE YU SHENGWUWULI JINZHAN [PROGRESS IN BIOCHEMISTRY AND BIOPHYSICS] in Chinese Vol 17 No 2, Apr 90 pp 121-125

[English abstract of article by Ding Yan [0002 1484], Department of Electronics, Chinese S&T University, Chai Zhenming [2693 2182 2494], Institute of Electronics, Academia Sinica, Beijing, and Chen Chuanjuan [7115 0278 3197], Institute of Biophysics, Academia Sinica, Beijing]

[Text] An algorithm of Stepwise Discriminant Analysis is used in the classification of Plasmodium blood smear, 9 features of the red cell is extracted. Some 169 red cells (among them 130 cells are normal, 39 contain Plasmodium) are used as training set, 192 red cells (among them 157 cells are normal, 35 contain Plasmodium) as test set. The group has done the statistical analyses and got good results. For test set, the false negative rate is 11.4 percent, the false positive rate is 7.6 percent.

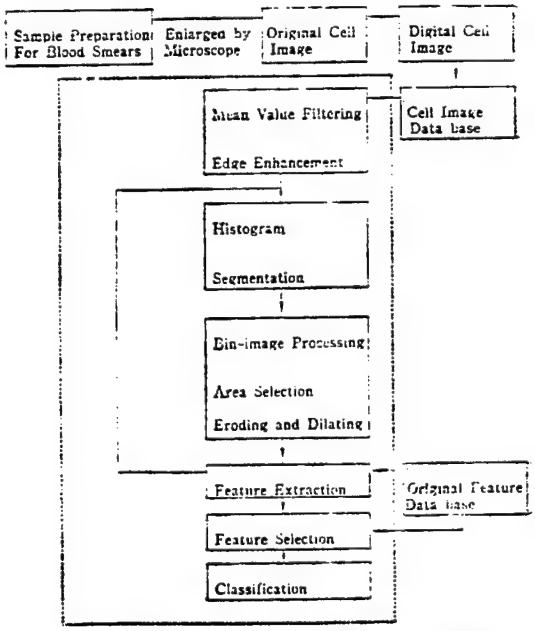

Figure 3. A System Block Diagram for the Classification of Plasmodium Blood Smear

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Epidemic Hemorrhagic Fever: Detection of Viral Antigen in Human Peripheral Blood Lymphocytes

40091013B Beijing ZHONGHUA YIXUE JIANYAN ZAZHI [CHINESE JOURNAL OF MEDICAL LABORATORY TECHNOLOGY] in Chinese Vol 13 No 2, Mar 90 pp 87-88

[English abstract of article by Gu Xianshi [7357 0341 0099], You Zhongqiong [3266 0022 8825], et al., Health and Antiepidemic Station, Guangan, Sichuan]

[Text] In this study, total blood lymphocytes were prepared from 16 patients with epidemic hemorrhagic fever (EHF) by a density gradient on Ficoll-Hypaque, and then T and B cells purified by passing the lymphocytes over a nylon wool column with modifications. The purities of the total lymphocytes, T cells and B cells were 97.8 +/- 2.3 percent, 91.6 +/- 4.5 percent and 74.2 +/- 12.1 percent, respectively. Also, an improvement on cell fixation and drying resulted in quality slides.

Detection of EHF viral antigen by direct immunofluorescence assay using monoclonal antibodies to EHF viruses showed that the total lymphocytes, T cells and B cells were infected with EHF virus during the early stages of the disease. No specific fluorescence was seen in the cells from the late diuretic phase to convalescent phase. The results suggest that virus-infected blood lymphocytes in EHF may partly contribute to the impairment of immune function and to the in vivo spread of virus to its target sites.

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A Simple and Rapid Method of Extracting Adenovirus DNA

40091013C Beijing ZHONGHUA YIXUE JIANYAN ZAZHI [CHINESE JOURNAL OF MEDICAL LABORATORY TECHNOLOGY] in Chinese Vol 13 No 2, Mar 90 pp 91-93

[English abstract of article by Zheng Yongchen [6774 3057 2525], Liang Dong [4731 2639], et al., Department of Pediatrics, The First Teaching Hospital Norman Bethune University of Medical Sciences]

[Text] In this paper, it was reported that adenovirus DNA was extracted from infected Hela cells by the method of PEG(polyethylene glycol). The result showed that the preparing of DNA was better in quantity and purity, and could be used to analysing restriction endonuclease mapping and DNA recombination. The method without special equipments was more simple and rapid than modification Hirt method. It could be used in any common laboratory for preparing virus DNA. The method to analyse the genome types of adenovirus types 3 and 7, which gave a good result, has been used.

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Study of Two-Enzyme Electrode for Maltose Determination

40091013E Shenyang FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 18 No 4, Apr 90 pp 370-372

[English abstract of article by Zhou Hui [0719 1979], Liu Hui [0491 6540] et al., Department of Molecular Biology, Jilin University, Changchun, 130023]

[Text] Glucoamylase and glucose oxidase were immobilized on the platinum plate surface of the sensor of an electrode (φ = 1 cm). The linear range for maltose determination is 5.0 x 10^{-5}-1.0 x 10^{-4} mol/L and the response time is 30 seconds. Fructose, sucrose, galactose, and starch do not disturb the maltose determination. The disturbance of glucose can be removed by glucose electrode. The maltose electrode can be used repeatedly over 500 times and after 2 months its sensitivity does not change.

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Studies on Structure-Activity Relationships and Receptor Binding Feature for 3-Methylfentanyl Derivatives

40091013G Beijing YAOXUE XUEBAO [ACTA PHARMACEUTICA SINICA] in Chinese Vol 25 No 3, Mar 90 pp 178-185

[English abstract of article by Xu Xiurong [1776 0208 1369], Zhu Youcheng [2612 0645 2052], et al., Shanghai Institute of Materia Medica, Academia Sinica, Shanghai 200031]

[Text] Ohmefentanyl is not only a potent analgesic agent, but also a selective ligand for μ opioid receptor. In order to search for more potent analgesics, more selective ligands and long duration of analgesic action in 3-methylfentanyl derivatives, we made modifications of the 1-phenethyl and 4-N-propionyl groups in 3-methylfentanyl and synthesized 15 new compounds. The analgesic activity, duration of analgesic action, receptor binding affinity and opioid sub-receptor selectivity of some of these compounds were measured. Primary pharmacological results showed that most of the compounds in this series possessed morphine-like effects. The analgesic activities of them were about 2-180 times more potent than that of morphine. The duration of analgesic action of the tested compounds was 6-10 times longer than that of fentanyl. The receptor binding affinities (IC_{50}) of compounds 1-4 were 10^{-7}-10^{-8} mol. Compound 13 displayed the best binding selectivity on μ opioid receptor site with ratio $\mu/\delta > 700$ in rat brain membrane and μ/δ = 1000 in mouse brain membrane. The new compound may be proposed as a useful tool in studying the opioid receptor. According to the result of equations in reference 11, compounds 7-14 were designed and prepared. The observed log 1/c values of them were much closer to the calculated values.

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Study of Snake Venom—Agkistrodotoxin

90CF0341A Beijing KEXUE TONGBAO in Chinese Vol 35 No 1, Jan 90 pp 1-7 [MS Received 31 Jul 89]

[Article by Xu Ke [1776 4430] of Shanghai Institute of Physiology of the Chinese Academy of Sciences: "Presynaptic Toxin Isolated From A. b. Brevicaudus Venom: β-AgTX"]

[Text] There are over 20 species of poisonous snakes in China. The most widely found and largest in quantity is Agkistrodon halys Pallas (A. halys) in the agkistrodon genus of the Crotalidae family. Hence, it poses a larger threat to human life[1]. Based on our physiological observation in 1976, the venom of agkistrodon in Jiangsu and Zhejiang contains both presynaptic and postsynaptic toxin[2,3]. This was followed by the successful separation of presynaptic toxin from the venom and we have named it agkistrodotoxin (AgTX)[3-5]. Since then, the neural toxicology and physico-chemical properties of AgTX have been systematically investigated. Several pieces of work, such as the determination of terminal amino acid, amino acid composition and sequencing, were done in collaboration with other laboratories in the world (see references with *).

In view of the fact that postsynaptic toxin was isolated from the venom[6], we suggested that the presynaptic and postsynaptic toxin be named β-AgTX and α-AgTX, respectively. This paper is limited to the discussion of information related to β-AgTX.

I. β-AgTX

1. Agkistrodon and Its Crude Toxin

Based on various reports, agkistrodon has been found in all provinces in China with the exception of Tibet and Hainan[1]. As a matter of fact, there is no consensus for the classification of agkistrodon among Chinese scholars. In recent years, it was found in our work that the composition of the toxin in the venom varies from region to region. For example, the neurotoxin from the eastern provinces such as Jiangsu and Zhejiang is significantly different from that from Xinjiang in the northwest. Moreover, neurotoxin was not found at all in the venom from snakes at Shedao near Dalian[7,8]. Zhao Ermi, et al.[9] suggested that agkistrodon be further classified. Based on this suggestion, the agkistrodon found in Jiangsu and Zhejiang shoud be named Japanese short-tail agkistrodon. In Latin, it is Agkistrodoon blomhoffii brevicaudus Stejneger (A. b. brevicaudus in abbreviation). In the papers published by our laboratory, we have called it agkistrodon from Jiangsu and Zhejiang and A. b. brevicaudus.

A. b. brevicaudus is approximately 60-70 cm long. Its venom is viscous with a water content of approximately 70 percent. After the venom was collected in the summer and fall, it was freeze-dried into crude toxin (powder) to be stored in a desiccator for experimental use.

2. Toxicity of the Crude Toxin

The crude toxin is a light yellowish powder. It contains approximately 80 percent peptide and protein by weight. The half lethal dose (LD_{50}) is 0.8 mg/kg (abdominal injection in mice). The primary symptoms include abdominal bleeding, flaccid paralysis, and breathing difficulty. This shows that the venom is a mixture of bleeding and neural toxin, in agreement with clinical symptoms associated with snake bite.

Bleeding toxin acts on the blood and the circulatory system, and neurotoxin acts on the nervous system. Their toxicology effect and cause of death are totally different. Therefore, the primary cause of death due to agkistrodon bite is an important clinical question. Nevertheless, we could not find any relevant information in the literature. Some clinical papers and books customarily have described it as mainly a circulatory toxin with some neurotoxin mixed in it[1].

Experimental observation with regard to this issue was made. It was found that the primary fatal factor is its neurotoxin[2]. For instance, when a dose of toxin equivalent to a snake bite (1 mg/kg or more) was given to a guinea pig or rabbit intramuscularly or intravenously, it would die due to paralysis and respiratory arrest. If artificial ventilation is provided prior to respiratory failure, the animal might survive for several more hours, or even up to more than 1 day. When a mouse received the above equivalent dose of crude toxin, when the thoracic cavity was opened after the breathing had stopped, its heart was found to continue beating for up to more than 1 hour. Therefore, respiratory paralysis caused by the neural toxin is the fatal cause of such snake bite. This simple observation provides an experimental basis for the clinical work on injury from A. b. brevicaudus.

3. Cause of Respiratory Paralysis

Concerning the issue of whether respiratory arrest caused by the crude toxin is a central or peripheral problem, our experimental results also differ from earlier findings. Some authors believe that the toxin could pass the blood-cerebal barrier easily and the central respiratory system is also sensitive to it. Therefore, they thought the associated respiratory paralysis is central in nature[10].

In our work, the effect of ventricular injection of the crude toxin was compared with that of intravenous injection. When ventricular injection was at the dose range of 30-50 μg/kg, the rabbit did not move much. However, there was no respiratory distress. When the injection dose was increased to 100, 500 and 1000 μg/kg, the rabbit typically died within 6, 4 and 2 hours, respectively. The symptoms prior to death include restlessness, running, howling, salivation, incontinuence, muscular spasm and stiffness of limbs. When 1000 μg/kg of toxin was intravenously administered to a rabbit, the sympthoms were flaccid paralysis and respiratory difficulty. Finally, it died from respiratory arrest. This experiment shows that the toxin could not easily pass the blood-cerebal barrier and was not sensitive to the respiratory central[2].

In another experiment, ^{125}I labelled crude toxin was injected subcutaneously into the hind leg of a mouse. The animal was sacrificed in 5 hours and the radioactive contents in various tissues and organs were determined. Using the content in the kidney as 100, there was 68.1 in the blood, 59.5 in the lungs, 51.4 in the spleen, 30.6 in the liver, 24.0 in the diaphragm, 23.9 in the heart, and 3.7 in the brain. This experiment indicates that the least amount of labelled toxin entered the brain.

Finally, the electro-physiological method was used to analyze the respiratory arrest caused by the crude toxin. Under anesthesia and artificial ventilation, the phrenic nerves of rabbits and guinea pigs were separated and cut. A pair of silver electrodes were placed on the central end to record the discharge from the respiratory central. The abdominal cavity was then opened to put a mono-polar disc electrode on the side of the diaphragm where the nerves were left intact to record the diaphragm discharge. Several hours after the crude toxin (1 μg/kg) was injected intravenously, the diaphragm discharges were getting weaker, until respiratory discharge was completely lost. However, respiratory discharge continued from the phrenic nerve and even became stronger in some cases. This finding shows that the respiratory arrest caused by the toxin is peripheral in nature[2].

4. Selectivity of Junction Transfer of the Crude Toxin

When treating a phrenic nerve specimen of a guinea pig with a 300 μg/ml crude toxin solution, the amplitude of muscular contraction from indirect stimulation gradually decreased to zero. By then, indirect stimulation could not cause muscular contraction at all. Nevertheless, direct contraction could still cause contraction and nerve conduction was not affected. This indicates complete blockage of junction transfer[2]. When the experiment was repeated with the jugular biventer of a chicken, complete blockage of junction transfer was rapidly achieved at a lower dose (140 μg/ml). In addition, the acetylcholine sensitivity of the muscle was lowered by 50 percent compared to the control upon transfer blockage. A possible explanation is that this transfer blockage might be both presynaptic and postsynaptic in nature[3]. This hypothesis was verified by an electro-physiology analysis of the phrenic nerve of a guinea pig. First, the toxin significantly lowered the potential of acetylchlorine in the end-plate region in microelectrophoresis of acetylcholine. This shows that the toxin reduced the acetylcholine sensitivity of the junction membrane. On the other hand, at a higher toxin concentration, the frequency and quantum content of the end-plate potential declined rapidly. However, at lower toxin levels (40-100 μg/ml), both processes rose first before declining. Such a biphasic effect indicates that the toxin is presynaptic[3].

5. Isolation and Purification of β-AgTX

The neurotoxin was obtained by processing the crude toxin through DEAE-cellulose column chromatography. It was then treated twice with Sephadex G 50 column chromatography to result in some relatively pure β-AgTX. In some physiology experiments, this toxin was used[4]. This toxin was further purified using a variety of methods, such as isoelectric focussing in electrophoresis using polyacrylamide plate. The purified β-AgTX was used for the determination of amino acid composition and sequencing[12].

The minimum lethal dose (LD_{100}) of β-AgTX is 55 μg/kg (abdominal injection in mice)[12].

6. Pre-Junction Blockage of β-AgTX

When complete junction blockage was found in the jugular biventer of a chicken with β-AgTX (60 μg/kg), the acetylcholine sensitivity of the muscle specimen was comparable to that of the control prior to exposure to the toxin, indicating that the blockage of junction transfer totally came from before the junction. As for the effect of β-AgTx on the junction, analysis was also made on the phrenic nerve specimen of the guinea pig. Our experimental results show that junction transfer was completely blocked within 2 hours under the effect of β-AgTX (200 μg/ml). However, there were changes in the compound movement potential, terminal movement potential, cell membrane potential and muscle contraction (in response to direct stimulation). When the toxin level was lower (40 μg/ml), both end-plate potential frequency and end-plate potential quantum number increased first and then declined in a biphasic manner[13].

A detailed observation of the fine structures of the junction of the phrenic nerve of mice poisoned by β-AgTX (6-8 μg/mouse, subcutaneous injection) did not show any change before and after the junction in the early stage. However, apparent changes were found in front of the junction in the late stage. The number of synapses was reduced or even disappeared. Mitochondria swelling and breakage were also found. Nevertheless, the synaptic gap width and post-junction crease showed no change[14]. In this work, no significant change in the pre-junction membrane was found. However, in later observations, especially in late-stage animals that

Figure 2. Comparison of Amino Acid Sequence of β-AgTX to Those of Other Presynaptic Toxins and Their Toxic Subunits

Key: *Common invariant amino acid of two groups; white dot—common invariant amino acid groups with previous groups; black dot—common invariant amino acids groups with next group.

survived longer, a significant increase in the Ωtype structure similar to that found in the late stage of poisoning associated with β-bungarotoxin, notexin and taipoxin[16] was found and is shown in Fig. 1 [photograph not reproduced] (Xu Ke, unpublished work).

7. Phospholipase A_2 Activity of β-AgTX

To date, all presynaptic toxins have phospholipase A_2 activity. Or, there is a subunit with enzyme activity in the molecular structure. Enzyme activity and neurotoxin are closely related. Furthermore, some phospholipase compounds with low or no neurotoxicity have also been found in the venom. Their molecular structures are very similar. β-AgTX also has phospholipase A_2 activity. Further, when its enzyme activity was treated by an inhibitor, ρ-bromophenacyl bromide, both the enzyme activity and toxicity dropped rapidly. The latter falls more rapidly, generally to 1/10 of its original level, within 2 hours. This magnitude of change, however, takes 8 hours for the former [17].

8. Physico-Chemical Properties of β-AgTX

It is a single-chain polypeptide consisting of 122 acid groups. The calculated molecular weight is 13900D. The amino acids attached to N and C have been reported to be glycine[7] and serine[18], respectively. However, they were finally determined to be asparagine and cysteine[19], respectively. The molecule contains 14 cysteine molecules, forming 7 pairs of double-sulfur bonds.

There are 16 alkaline amino acid and 17 acidic amino acid groups (isopotential point is pH 6.9). There is only one amino acid group and there is no tryptophane group. It has good thermal stability. The toxicity remained unchanged after 20 minutes at 90°C. The composition and sequencing of the amino acids are shown in Fig. 2[12,19] and Table 1, respectively.

Table 1. Amino Acid Composition of β-AgTX

	Analysis	In the sequences
CmCys	13.47	14
Asp	16.10	7
Asn	—	9
Thr	7.83	8
Ser	5.15	5
Glu	13.14	10
Gln	—	3
Pro	1.92	2
Gly	12.84	13
Ala	4.06	4
Val	2.84	3
Met	1.73	2
Heu	5.11	5
Leu	5.07	5
Tyr	10.02	10

Table 1. Amino Acid Composition of β-AgTX (Continued)

	Analysis	In the sequences
Phe	5.96	6
Lys	8.89	9
His	0.75	1
Arg	5.82	6
Total	—	122

Figure 2 also includes the amino acid sequences of several potent presynaptic toxins (or toxic groups) and divides them into two groups[20] based on the suggestion of Heinrikson et al. β-AgTX should belong to group II.

II. Conclusions

There are approximately 2,500 species of snakes and approximately 200 of them are lethal for humans or other large animals. They belong to the Elapidae, Hydrophiidae, Viperidae and Crotalidae. The venom of the first two species is a neurotoxin and that of the latter two is a circulatory toxin. In some cases, it also contains a neurotoxin. Regardless of the source of the neurotoxin, most of them are nerve-muscle junction transmission blockers. A toxin that selectively acts on the membrane before the junction is a presynaptic toxin (β-type) and one that acts selectively on the membrane behind the junction is a postsynpatic toxin (α-type). To date, a large number of postsynaptic toxins have been isolated from the Elapidae and Hydrophiidae and a few presynaptic toxins have been isolated from the other three families other than the Hydrophiidae. Therefore, the isolation of α-AgTX (discovered for the first time in poisonous snakes outside the Elapidae and Hydrophiidae family which will be discussed in a separate paper) and the study of β-AgTX with reference to venom protein structure and function are very significant.

Among the presynaptic toxins listed in Figure 2, ammodytoxin A, notexin and notechis II-5 are single-chain polypeptides. Crotoxin, vipoxin, and the four β-bungarotoxin are formed by two subunits. Taipoxin has three subunits. The interesting point is that the alkaline group of crotoxin and vipoxin has enzyme activity, while the other acidic group has no enzyme activity[21,22]. The two subunits of β-bungarotoxin are both alkaline; however, chain A has enzyme activity and is toxic.[23] The α-subunit of taipoxin is strongly alkaline and toxic (approximately 500 times lower than the original toxin) and it has enzyme activity. Its β and γ-subunits are neutral and acidic, respectively[24]. It is not hard to see that these potent presynaptic toxins are alkaline phospholipase or contain an alkaline phospholipase subunit. Karsson pointed out that "alkaline phospholipase A is generally toxic, either a presynaptic toxin or myonecrotoxin, with a lethal dose of 500 μg/ml or lower for mice."[25].

However, β-AgTX is a potently toxic alkaline phospholipase A_2. Therefore, its structure is important to the study of the β-toxin of poisonous snakes.

There are usually more than 2 amino acid groups in a presynaptic toxin. It was proven that ρ-bromophenacyl bromide, a phospholipase inhibitor, could react with one amino acid group (position 48 in Figure 2) of taipoxin to loose its enzyme activity and toxicity[26]. β-AgTX molecule only contains one amino acid group in position 47 (position 48 in Figure 2). After being treated by the above inhibitor, its enzyme activity and presynaptic toxicity both dropped rapidly. However, the rate of decline for the latter is four times faster than that for the former[17]. This suggests that the neurotoxin may not, at least not primarily, be due to enzyme activity. In a recent report by Jiang, β-AgTX at concentration as high as 10.5 μmol/L could not induce cell membrane damage to a nerve cell tumor (NIE 115)[27]. In addition, Rydqvist et al. found that β-AgTX has no specificity effect on the cell membrane channel and capacitance of the stretch sensor of crayfish[28]. These studies show that β-AgTX should have a unique binding site before the junction.

β-AgTX is homologous to all toxins listed in Figure 2. It has 35 invariant amino acids. One group in the Elapidae family has 46 and one group in the Viperidae and Crotalidae families has 56, including 7 double-sulfur bonds: 27-121, 29-45, 44-100, 51-93, 61-86, 79-91 and 50-128. Therefore, it seems to be appropriate to put β-AgTX in group II as Heinrikson has suggested.

The alkaline subunit of β-AgTX and that of crotoxin (or part B) are both composed of 122 amino acid groups, including 99 invariant amino acids. Recently, Choumet et al.[29] developed antisera for parts A and B of crotoxin. Based on the ELISA method, antibody A and antibody B, especially antibody B, react with β-AgTX strongly. Nevertheless, they only react weakly with Ammodytoxin A and they have no effect on notexin and β-bungarotoxin in the Elapidae family. This suggests that the A. b. brevicaudus found in China might be related to the Crotalus durissus terrificus found in South America.

Although some ideas related to the neurotoxin center have been presented based on a comparison of the first-level structure of the presynaptic toxin, there is no consensus, however. In general, although these toxins may have similar mechanisms, they may not have the same toxic center. A preliminary suggestion was also made in our work[19].

Finally, three presynaptic toxins were isolated from the venom of Agkistrodon intermedius found in Xinjiang and one postsynaptic toxin was isolated from the venom of A. b. ussuriensis found in Jilin. Their relation with α-AgTX and β-AgTX is yet to be investigated[30].

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New Computer Viruses, Antivirus Software Products

Notes on New Products Nationwide

90FE0121A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 10, 14 Mar 90 p 3

[Article: "Where To Find Antivirus Software"]

[Text]

Beijing

The YB-4 antivirus software, which is capable of eliminating a variety of virus cross-infections, has now been developed by the Yazhi Technology Development Company, Ltd., a Sino-Japanese joint-venture firm in Beijing. The YB-4 software combines several programs that detoxify virus cross-infections into one software package. The YB-4 software can eliminate seven viruses, including the Bouncing Ball, Marijuana, Brain, and Jerusalem B viruses, and mutations of the Bouncing Ball and Marijuana viruses. The software is integrated, fast, thorough, safe, reliable, easy to operate, and extensively adaptable. (Wang Jinyu [3769 6855 3768], Yang Gewei [2254 7245 0251])

The computer department of the Beijing Institute of Chemical Engineering has developed a Chinese version of antivirus software that can eliminate boot-sector infections. It is capable of eliminating and immunizing against the Bouncing Ball and Marijuana boot-sector viruses. (Zhao Ying [6392 5391])

The Beijing University Press now has antivirus software that can eliminate the Bouncing Ball virus, the Marijuana virus, the 648 virus, the dBase virus and the Brain virus. The five programs are available on a 360K 5.25 inch floppy disk. The user simply runs program VA, VB, VC, VD or VE, which will perform appropriate virus detection and removal and will immunize his system. The software is convenient to use and produces good results. (Li Fushun [2621 4395 7311]

Fujian

The computer station of the Sanming Chemical Engineering Plant in Fujian Province has developed a system that thoroughly eradicates the Marijuana virus.

This Marijuana virus removal system is extremely convenient to use. It requires no special commands: the virus removal disk is used to boot the system, and it automatically eliminates viruses on the hard disk (the program disk itself can be used as a CCDOS system disk). In this system, the user simply inputs such DOS disk operation commands as DIR, TYPE, and COPY, and the Marijuana virus will be automatically found and eliminated from the floppy disk (including encrypted [copy-protected] game disks).

This system will run in all environments that support CCDOS, including GW0520, IBM PC, PC/XT, 286 and 386 DOS systems. (Dong Nanyong [5516 0589 0516])

Wuhan

Central China Science and Engineering University's computer department has developed the SYSGUARD system, a general antivirus and immunization system, which can guard against almost all viruses currently known in China. The software is memory-resident and monitors the system. It can discover any attempt to alter the operating system, the disk boot sector, or executable files, and it immediately displays an eye-catching red warning message in an exploding window. This warning window provides considerable technical detail, such as the target of the virus attack, the possible virus type, and so on.

The software can also restore disk boot sectors that have been infected by the virus or that have been inadvertently damaged. SYSGUARD consists of an installation program, a group of functional programs, and a data file. The entire program makes use of expanding windows and menu operations, so that the user can install the software and repair the disk in less than a minute. (Hu Yiming [5170 0076 7686])

The Wuhan University computer department has developed detoxification software for the Black Friday virus, which is available on a 360K floppy disk. (Lei Jun [7191 6511])

Henan

A group in the Henan Province Computer Society has developed antivirus software for use against the widespread Bouncing Ball virus. Use of this software to remove the virus and immunize the system has no effect on the data stored on the original disk. It is safe, reliable and convenient to use. It can eliminate viruses in the user's computer and immunize it if it is virus-free. Members of the Henan Province Computer Society have also written software to diagnose and treat the Marijuana virus.

Sichuan

The Artificial Intelligence Laboratory of the Sichuan University computer department has developed the "Computer Virus Kexing ["wonder drug"] antivirus software, sets 1 and 2. Set 1 eliminates viruses that infect the boot sector, and set 2 eliminates a variety of parasitic viruses. Both have an excellent user interface.

Jiangxi

The Computer Office of the Jiangxi Province Publishing Bureau has developed three programs to diagnose and treat the Bouncing Ball, Marijuana and Brain viruses. All three programs are reliable and safe. [Zou Zhenquan [6760 2182 2938]). [See also JPRS-CST-90-010, 10 Apr 90, pp 17, 32]

The SOS Antivirus System

A group in the Fujian Province Computer Society has developed an "antivirus expert," the SOS ["Suppress

Operating-System Viruses"] antivirus system, which can immunize floppy-disk and hard-disk systems. Its main capabilities are:

1. the ability to forcibly activate the Bouncing Ball virus and demonstrate its activity, thus providing a clear awareness of its potential harm, despite its being a benign virus.

2. SOS diagnoses and eliminates the Bouncing Ball virus and its various mutations, removes [falsely labeled] "bad sectors," and can recover all of the disk space through which the virus program has snowballed.

3. SOS can diagnose and treat the Hard Disk virus, the Marijuana, Brain, "Shady Lane Stroll" and Lehigh viruses one-by-one and set an overall vaccination flag.

4. The SOS system can successively diagnose and eliminate multiple viruses infecting a disk. Because the method of "fighting viruses with viruses," which uses a virus program (called a "friendly" virus) that is capable of eliminating other viruses, may cause cross-infection between viruses and thus produce unpredictable results, SOS also eliminates such "friendly" viruses.

5. SOS can also prevent the entry of various as-yet undiscovered operating system viruses and can sound the alarm if there is a virus invasion.

SOS is run by using the command SOS d: (where d is the letter of the drive to be vaccinated) or by coping the file SOS.EXE onto the hard disk or floppy disk that is to be vaccinated: when SOS.EXE is run on this disk, it will remove all of the viruses that it recognizes and set a characteristic vaccination flag. (Wu Rong [2976 2837])

Vaccination Software from Yunnan Firm

90FE0121B Beijing JINGJI RIBAO in Chinese 31 Mar 90 p 4

[Unsigned article: "China Develops Antivirus Vaccination Software"]

[Text] Since last October, when Dutch police authorities announced a computer virus attack, computer experts in all countries have stepped up their efforts to develop antivirus software. A Yunnan computer services company recently issued several antivirus software packages.

A computer virus is a destructive program that can produce infection anywhere. It can interfere with a computer's operation and cause the loss of millions of data items in an instant. Several dozen viruses have been discovered worldwide, and four have been found in Yunnan. The Yunnan Computer Technical Services Company, which has installed more than 3,000 computers in more than 1,500 institutions, has used its own solid software development team to develop software capable of eliminating the Bouncing Ball virus and the Marijuana virus. This software not only can effectively block the spread of these two viruses, but can also vaccinate against them, giving the computer system the ability to resist them.

Editor's Note on New Virus Outbreaks

90FE0121C Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 13, 4 Apr 90 p 34

[Editorial]

[Text] Since computer viruses appeared in China, they have become a serious problem for China's computer users. More than 100 viruses have appeared worldwide, and many viruses have several mutations. It has been stated that seven main viruses have entered China: (1) The Bouncing Ball virus, also called the Billiard Ball, Ping-Pong Ball, and Round Dot virus; (2) the Marijuana virus, also known as the Stone virus; (3) The Black Friday virus, also called the Jewish virus, Israeli virus, Jerusalem virus, Hebrew virus, and [illegible] virus; (4) the Vienna virus, also called the 648 virus; (5) the Yankee [Doodle] virus; (6) the Music virus; and (7) the Raindrop virus, also called the Cold virus. Some of these viruses, such as the first three, are widespread in the country, and homegrown mutations of the Bouncing Ball and Marijuana viruses have even appeared. At this point, we must admit that computer viruses have become a serious threat to China's computers, which must be taken highly seriously by the authorities.

Although China's computer network has not yet been fully set up, computer use in the country is already rather widespread, and some applications systems are being attacked by computer viruses; no computer user is free from worry about virus attacks. In response, units can only draw up their own in-house management measures, which all limit to some degree the implementation of extensive data sharing in computer systems. As a result, a new tradeoff has appeared in the management of computer system use: the tradeoff between extensive data sharing and computer system security. Thus, a minute investigation of the relevant mechanisms of computer viruses and of methods of eliminating them and guarding against them, and even the establishment of a set of rational and effective legal provisions on computer use, have become a major topic with which the computer world must deal.

Disseminating knowledge about computer viruses, eliminating excessive fear of them, and disseminating virus prevention and elimination measures have been the purpose of the series of articles carried in this newspaper. We recall that last October 13 (a Friday) was the day most feared by the world's users of IBM PC's and PC compatibles; but the Black Friday virus did not extensively attack computer users throughout the world. April 13 of this year will also be a Friday, and since the Black Friday virus has now entered China, there is some question as to whether that day will bring losses to China's computer users. This is a problem that worries many computer users. In order to guard against future trouble, this week's material focuses on several methods of dealing with the Black Friday virus. We hope that they will be of some help to users.

New Tool From Beijing University

90FE0121D Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 13, 4 Apr 90 p 36

[Article by Guo Zuomin [6753 0146 3046]: "A Computer Virus Detection, Elimination and Vaccination Tool"]

[Text] The software publishing department of Beijing University Press recently issued a computer virus detection, elimination and vaccination tool.

This tool can detect, eliminate and vaccinate against six viruses: the Bouncing Ball virus, the 648 virus, the Marijuana virus, the Brain virus, the dBase virus, and the Israeli virus.

In addition, it can effectively prevent the Yankee Doodle virus from spreading and damaging software and entire disks.

The software also has a universal Watchman program that can issue a warning against most known viruses and many unknown viruses and their mutations.

Outbreak of Friday the Thirteenth Virus

90FE0121E Beijing RENMIN RIBAO in Chinese 17 Apr 90 p 2

[Article by Jiang Zaijong [1203 0961 1813]: "Friday the Thirteenth Virus Outbreak in Computers"]

[Text] Beijing (XINHUA)—Officials of the Ministry of Public Security have revealed that there was an outbreak of the Friday the Thirteenth virus at computers in several locations in China, in which the operating efficiency was degraded and programs were damaged to various degrees.

Computer viruses are specially designed computer programs or code that lie hidden in computers and are very hard to detect, but which are highly destructive and contagious. The Friday the Thirteenth virus was discovered at Hebrew University in Israel in May 1988.

New Viruses, Estimates of Infected Computers

90FE0121F Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 17 Apr 90 p 1

[Article by Dong Fenglei [5516 7364 7191] and Wang Peilai [3769 1014 0171]: "Computer Viruses Extremely Harmful, No Time to Wait in Taking Steps"]

[Text] We recently were told by officials that the computer viruses circulating throughout the world have also spread to China and that six viruses, in three categories, have already been discovered in Beijing. The authorities are calling on leaders at all levels to take computer system security seriously and to conscientiously implement security and protection measures.

It is stated that several thousand computers in China have already been infected by computer viruses. Spot-check statistics indicate that several hundred computers are infected in Beijing alone and that the number is increasing.

Because of the infective character of the viruses, computer information systems are seriously threatened and may suffer serious damage. As a result of a virus attack, all 50 microcomputers at the computer center of a certain university in Beijing were infected in the course of a week, bringing work to a standstill. Virus infection of microcomputers at a certain chemical engineering plant adversely affected work for a month. The viruses that have now been found in Beijing, namely, the Israeli virus, the Bouncing Ball virus, the Brain virus, the Marijuana virus, the 648 virus, and the Yankee Doodle virus, affect computers to various degrees: in mild cases, system performance is degraded, but in severe cases programs are damaged or all information stored in memory is eliminated.

Officials declare that thorough checks of computers and floppy disks must be made and that immediate measures must be taken if viruses are discovered: they must be isolated and sealed for virus detection and disinfection and the incident must be reported to the computer communications section of the municipal public security office. In addition, the computer management system should be made more stringent and the playing of computer games should be prohibited.

Scanning/Detoxification Software From Beijing Group

90FE0121G Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 23 Apr 90 p 2

[Article by Yu Zhenli [0205 0587 4539]: "Xintong Group Software Engineering Company in Beijing Develops Computer Virus Scanning and Detoxification Software"]

[Text] Since the Xintong ["Syntone"] Group Software Engineering Company of Beijing first issued computer scanning and disinfection software this January, three new releases of the software have come out. The scanning and disinfection software has been praised by many users.

The development of computers has resembled the development of mankind itself: just as many diseases of man have appeared, numerous computer viruses have been steadily multiplying and spreading, causing various degrees of loss to computer users and even doing a certain amount of harm to society.

Several prevalent viruses now are well understood. For example, the Bouncing Ball or Ping-Pong Ball virus can infect microcomputers by various routes. If the computer is infected, a small ball appears on the screen, bouncing back and forth like a ping-pong ball, which greatly slows the operating speed of the computer and damages normal operation of the program. This virus has the greatest ability to propagate. Infection with the

Jerusalem virus results from running a program containing the virus. The virus is memory-resident, and if other programs are run, they too become infected. The virus increases the number of bytes in a file; when it is run again, it becomes reinfected and again increases in size. Interestingly, on a Friday the 13th it damages the documents on the disk. The Vienna virus has milder effects than the Jerusalem virus, but its path of transmission is the same. The Marijuana virus products effects similar to those of the Ping-Pong Ball virus: under certain circumstances a line of information appears on the screen. The Yankee Doodle virus causes files to become longer every time it is used, but the size of the increase varies. The 1701-1704 virus affects only files with the .COM extension. When infected, the file will become 1701 bytes longer. The Brain virus was first discovered in January 1986 in Pakistan. It is the only virus to date that contains its creator's name and telephone number. It affects only 5-inch floppy disks, not hard disks. The virus affects primarily the boot sector of the disk. The Syntone virus scanning and disinfection software consists of three parts: (1) the virus scanning software, which can scan for 56 viruses and display the location and name of the virus; (2) the virus warning software, which can stay resident in memory watching for 34 viruses and issues a timely warning if it finds them; (3) the antivirus program, which can eliminate the following viruses currently in circulation in China: the Ping-Pong Ball virus, the Vienna virus, the Jerusalem virus, the Marijuana virus, the Yankee Doodle virus, and the 1701/1704 virus.

The Syntone Software Engineering Company urges computer users to check regularly for changes in the length of their disk files; if they have increased in length, it is possible that they have become infected by a virus. A variety of virus programs are currently in circulation in society, and new ones are constantly appearing: thus the struggle against the virus programs will be a prolonged one. The Syntone Company will be continually improving its software system in order to help users eliminate all of their "ailments."

Vaccination Card From Shenzhen Joint Venture

90FE0121H Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 30 Apr 90 p 1

[Article by Xie Gengfa [6200 5087 4099]: "First Chinese-Produced Microcomputer Virus Protection Card"]

[Text] Beijing, Apr 29—The Huaxing Science and Technology Company, Ltd., a Sino-foreign joint venture in Shenzhen, has developed a microcomputer antivirus card, which today passed its expert evaluation in Beijing. It has an excellent ability to warn against and protect against microcomputer viruses that are current in China and abroad and will relieve the worries of a great number of computer users.

Computer viruses originated in the United Stated. It is stated that more than 140 viruses have already been found there. It is not long since computer viruses entered China, but China has no software copyright laws, and copying software is a common practice here; as a result, the various viruses have propagated rapidly in China, and the harm that they cause to users is on the increase.

To deal with the worldwide plague of computer viruses, last June the Huaxing Company set up a special task force. Its six young members are all graduates of the China University of Science and Technology. After analyzing several typical viruses, they realized that a basic characteristic of viruses is their self-replication, or infective ability.

This is also the vulnerable point of viruses. After repeated studies, they decided to use a combination of software and hardware: they designed an IBM PC expansion card which, when inserted in one of the computer's expansion slots, gives the computer immunity. Its fundamental operating principle is as follows; The card monitors the PC's data bus, and if it detects operations similar to those of a virus program, it immediately interrupts operation and alerts the user. In addition, it controls the outbreak to a certain extent. All virus protection techniques in this country and abroad reportedly involve detection and elimination, with software designed to deal with specific viruses. The use of hardware vaccination to deal with viruses has not previously been reported and is thus a first. Once the microcomputer virus protection card, which uses active measures against viruses, appeared, numerous representatives from the United States, England and Singapore, as well as from Taiwan and Hong Kong, instituted business discussions.

Figures on Infections, Nationwide Measures

90FE0121I Hong Kong LIAOWANG [OUTLOOK WEEKLY] (Overseas Ed.) in Chinese No 18, 30 Apr 90 p 13

[Article by Liu Jinghuai [0491 2417 2037]: "First Results in China's Efforts To Guard Against Computer Viruses"]

[Text] Since China instituted reform and opening to the outside world, the computer industry has grown by leaps and bounds. China has recently been infected by the computer viruses that have appeared abroad. In response, Chinese authorities have treated the matter with full seriousness and have begun research and protective measures.

In 1989, a number of computer systems in China were found to contain viruses. The Ministry of Public Security, which is responsible for computer oversight, immediately began an investigation. It was found that the computer viruses that had appeared in China, the Bouncing Ball virus, the Marijuana virus, the Brain virus, the Friday the Thirteenth virus, the Vienna virus, the Raindrop virus, and the Music virus had spread to the most serious extent, and that in addition the Yankee

Doodle virus, the Disk Killer virus, the Happy Sunday virus, the dBase virus and the Black Cross virus had also appeared in China.

The computer viruses spread rapidly in China. At the end of 1989, officials found that of the country's nearly 300,000 microcomputers, about 60,000 had been infected with the Bouncing Ball virus, an infection rate of about 20 percent. In some units, 70 percent of infected computers were infected with the Bouncing Ball virus, and 40 percent with the Marijuana virus, and many were infected with several viruses simultaneously. It is stated that the area with the greatest extent of computer virus infection is the State Statistical Bureau statistical system: thousands of microcomputers are affected nationwide, including some or all of the computers in the computer stations of 21 provinces, autonomous regions and directly subordinate cities, as well as cities with province-level economic decision-making authority, local cities, and even at the county level. The authorities found five types of viruses in computer information systems of certain key state projects.

As a result of infection with computer viruses, many departments and units have been unable to operate normally, some schools' instruction plans have been thrown into chaos, and many departments' statistical tables were issued late and data were lost; data and reference materials that some departments and units had spent years assembling were lost in an instant; the duty systems for certain major military activities also had virus outbreaks. This not only caused major losses to many departments and units, but also seriously harmed state security.

Analysis by the authorities found that the computer viruses that have appeared in China in the last few years had primarily originated abroad, and that they had entered China by different routes; some entered in imported computer systems and software, some were brought in by certain departments with foreign dealings in the course of official contacts, and some lay hidden in floppy disks brought into the country by returning individuals. The main factors causing the rapid spread of computer viruses are copying of floppy disks; release of floppy disks by some departments without checking them with virus detection software; the use of computer games; sale of virus-infected computers to users by computer plants or sales departments; use of infected disks by computer maintenance departments; and commercial software containing viruses.

A few persons in China have altered computer viruses, producing bizarre versions of the Bouncing Ball virus that display such things as musical staffs, oblique lines, triangles, sine waves, red peaches, cookies, and balls: they regard this is a kind of contest of wits, while in reality it has caused serious harm to computers. In addition, certain companies and units make profits from selling virus-removal software that not only is essentially incapable of eliminating viruses, but actually spreads other new viruses. Some companies actually sell at high prices virus-detection software that foreign companies have given to the relevant users. Some persons are engaged in creating new viruses. Books on this subject have recently appeared, describing in detail the operating principles of certain viruses, which may very easily induce people to create new viruses. Public security officials whom we visited warned that the authorities must strengthen computer management and conscientiously guard against infection by computer viruses.

Since computer viruses appeared in China in 1989, research on them has become a popular topic for many computer production, research, and applications departments, but this activity is still disorganized. The public security departments have therefore used various means to vigorously publicize the fact that the Ministry of Public Security's computer oversight organizations and the public security system's computer security oversight departments are involved with computer virus research and protective measures and will provide computer virus elimination services without charge to all departments and units. There are now methods of eliminating all of the seven computer viruses that are most widespread in Mainland China.

An official of the Ministry of Public Security responsible for computer virus oversight stated that in order to guard effectively against the spread of computer viruses, the following must be done:

—Computer user departments and units must step up political-ideological and professional and moral education of personnel involved in the computer information system and exercise stringent control over persons in direct contact with computers;

—Routine disk and data backup, a cautious attitude toward sources of software, and performance of system backup before the installation of new imported software, putting it into regular operation only after it functions normally in a test run;

—If a virus is discovered, it should immediately be reported to the computer security oversight section of the province, autonomous region or directly-subordinate city public security bureau; in addition, isolation measures should be taken until the virus has been thoroughly eliminated, after which the computer can be put into use again.

—Computer production, research and applications units may, with permission of the Ministry of Public Security, engage in systematic selection of technical personnel in the various industries with good professional and ideological qualifications to engage in research on virus prevention, detection and elimination; but the results must not be indiscriminately disseminated.

The official revealed that in order to take additional effective protective steps against computer viruses, the public security departments are cooperating with relevant units on high-level virus prevention research; they will set up as soon as possible a national computer virus

early detection and protection network and an information feedback system; in addition, the relevant departments are drafting a document entitled "Computer Information System Security Protection Regulations" and are strengthening legal measures for computer virus prevention in order to allow computers to play an even greater role in China's socialist modernization.

Data Chaos, Losses Manifest in Nation's Computers

90FE0121J Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 19 May 90 p 1

[Article by Liu Xudun [0491 1645 4163]: "Watch Out for Invasions of Non-Biological Viruses"]

[Summary] Worldwide reports of computer viruses since the 13 October 1989 "Friday the Thirteenth" incident have been numerous. In addition to the 100,000 computers in Holland that caught an infection, it is estimated that 70 percent of computers in South Korea have been infected by some virus. For example, this past 13 April, a day predicted to be dangerous, sure enough saw an invasion of the "Black Friday" (Friday the 13th) virus into mainland China.

On that day, the Shenzhen Municipal Accounting Office personnel discovered that data files in their IBM PC and Great Wall microcomputers had been destroyed. The Guangzhou northern railroad station workers noticed frenzied copying of the chaos in their files. At one of the offices of the State Science & Technology Commission, operators at three of the computers totally lost their data. Similar occurrences were detected at China Books in Beijing, at the Beijing Municipal Committee, and at other places in the capital.

A survey of 12,750 computers conducted last year by the Ministry of Public Security's computer oversight office revealed that 2,550 of them—or 20 percent—had caught the Ping Pong Ball virus. Authorities in Guangdong Province sampled 72 computer users in the provincial government and found that 55—or 75 percent—had discovered viruses. In the Northeast, over 20,000 computers in Heilongjiang Province have been infected, including over 80 percent of the machines at the Province Statistical Bureau.

Indigenously made viruses have been seen, too. The so-called "China Virus No 1," created by a student at a certain Guangzhou university by modifying a foreign virus, has spread even to some province-level computers. A Ministry of Public Security spokesman has revealed that much of the blame for domestically made viruses lies with students, especially those having returned from abroad, and that the Ministry is actively preparing laws and regulations on computer viruses, which will include harsh sentences for those found guilty of inventing new viruses.

More on Shenzhen Huaxing Vaccination Card

90FE0121K Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 21, 30 May 90 p 2

[Article by Xuan Gang [1357 0474]: "Shenzhen Huaxing S&T Company Aims for Market With New HXVPC Microcomputer Virus Protection Card, Now Accredited"]

[Summary] The Shenzhen Huaxing S&T Company, Ltd., is the first domestic firm to have developed a software-and-hardware-integrated microcomputer virus protection card, the HXVPC-I. This card, which recently passed its technical appraisal by an expert group from the Ministry of Aeronautics & Astronautics Industry, is now on the market. The new card, which employs large-scale integrated circuits [LSI], can be inserted into the expansion slot of IBM PC XT, AT, 286, 386 and compatible computers. The new product was exhibited at the recent Beijing National Computer and Applications Trade Fair and at the Hong Kong International Computer Exposition, where it attracted much attention from representatives of 10 firms from Hong Kong, Singapore, South Korea and elsewhere.

Another Anti-Virus Card Developed

90FE0121L Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 5 Jun 90 p 1

[Article by XINHUA news service]

[Summary] An "anti-virus card" designed to prevent microcomputers from being invaded by computer viruses has been developed by the China Computer Technology Services Company. This 12-centimeter-long, 5-centimeter-wide insertable board intended for a microcomputer's expansion slot has been shown to thoroughly protect machines from catching the most prevalent viruses in China today: the Ball virus and the Marijuana virus, as well as others. When an infected floppy disk is inserted into the computer, the card provides an audible warning and displays the message "Virus discovered!" on the monitor screen.

World's First Voice-Operated Chinese Typewriter Developed

90FE0159H Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 7 May 90 p 1

[Article by Chen Dong [7115 2639]]

[Text] The world's first voice-operated Chinese typewriter, the "Xinghe" [2502 3109] CTP voice-operated typewriter, came out before the May 1 holiday. It was developed by a group of young Ph.D's and M.S.'s in their 20's from the Xinhe Company. This new spoken-Chinese word processor, capable of listening, memorizing, writing and speaking, is a key breakthrough in speech recognition and synthesis technology and it has

paved the way for the development of the next generation of intelligent computers.

This reporter witnessed the following at the Beijing Xinghe Electronics Company: After turning it on, the typewriter said in a friendly manner: "The voice-operation system has been activated, please begin to speak." The operator read a document out loud into microphone. The Chinese characters read displayed rapidly on the screen. According to the spokesmen at the briefing, this typewriter can recognize all Chinese pronunciations. The response time for recognition is 0.1 second. Sixty Chinese characters can be input in one minute. The rate of recognition for all Chinese characters is 98 percent. The accuracy rate for Chinese-character input is 100 percent. It has a full-screen editor and the capability of typesetting. It is able to automatically recognize 90-95 percent of characters with identical sound [homonyms] and it has a learning and adaptive capability. At the same time, the typewriter can read out the characters from the National-Standard Second-Level Chinese Character Library, punctuation, numbers, mathematical symbols and English words at an adjustable speed. With all these functions, it is suitable for office automation, as well as in areas such as Chinese studies, communications, command management and so forth. Through tests, specialists unanimously agreed that the Xinghe CTP Voice-operated typewriter is in the lead both domestically and internationally.

When asked by this reporter, Chen Xinquan, the organizer of this project and head of Guangdong Foshan Eighth Radio Factory, said proudly: "The developers are all 'green' youngsters. I discovered them at Qinghua University in 1987, and was determined to provide an opportunity for these youngsters to complete this meaningful project. I have had a strong desire for many years to create an ideal environment for these domestically educated young science and technology people to grow and let their talents blossom in our land. These young people didn't disappoint me." Through years of hard-working and searching, they achieved a breakthrough in the core technology—speech recognition and synthesis. They sacrificed numerous weekends and holidays and stayed in the lab all day long. The "older brother," Tan Zheng, 29, didn't even go home when his wife was giving birth.

Some one has predicted that in the 21st century the next generation of intelligent computers will utilize the voice-operated system for computer control. Thus, Chinese has an unique advantage: there are only some 400 basic syllables while English has over 10,000; Chinese has four tones and some 1,200 pronunciations while English is in the hundreds of thousands. This means that Chinese will play an important role in the high-level information age of the present and the future.

The first model of the Xinghe CTP voice-operated typewriter will be shown at the Exhibition and Ordering Convention of Guangdong Electronics Products in Hong Kong in the middle of May. Xinghe's next plan is to develop a continuous-Chinese-speech voice-operated typewriter that can be operated by non-specialists.

Microcomputerized Radio Chinese-Character Image Transmission System Successfully Developed

90FE0159G Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 17, 2 May 90 p 2

[Article by Deng Xianchun [6772 6343 2504]]

[Text] A new microcomputerized radio Chinese-character image transmission system has been successfully developed by ZHONGGUO KEXUE BAO's [CHINA SCIENCE NEWSPAPER] Chengdu Zhili Science and Technology Development Division. The system is suitable for shortwave or ultra-shortwave transceivers. Specialists feel that the system embodies new design ideas and has complete functions. It realizes the integration of microcomputer communications and its performance has reached the domestic advanced level.

In today's information society, people have made new demands on communications methods and equipment. Radio communications people had wished to transmit Chinese characters, data, and images over the networks. Zhili took this assignment and began to conduct the research. After a year's hard work, the division succeeded in developing the long-sought microcomputer radio communications card, which can transmit Chinese characters, data, and images through radio transceivers over a range of hundreds to thousands of kilometers.

The transmission system consists of an IBM PC compatible (Great Wall) microcomputer radio communications card, an image scanner and software. It utilizes the IBM PC series and compatible Chinese-character editing function to perform transmission of Chinese characters, data, and imaging via the communications card over shortwave or ultra-shortwave transceivers. The transmission rate for Chinese characters can reach 500 per minute; bit error rate [BER] lower than 10^{-5} under normal conditions. The radio communications network and microcomputer are two independent systems. The connection between microcomputer and the network takes place only when the transmission of Chinese characters is requested. Compared to similar products, this system possesses features such as easy operation, good generalization, strong anti-interference capability, high performance/cost ratio, fast transmission speed, excellent security, a large number of functions, data-processing convenience, etc.

The success of the Microcomputerized Radio Chinese-Character Image Transmission System has opened a vast new horizon for the full development and utilization of microcomputers for radio networking. The system can be utilized as a radio network for areas such as public safety, transportation, forestry, weather forecasting, water resource management, earthquake prediction, oil industry, banking and so forth.

Rapid Serialization of Taiji Microcomputers, Minicomputers

90FE0159F Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 17, 2 May 90 p 1

[Article by Xiao Yan [2556 3601]]

[Text] The Taiji Computer Company is our nation's largest company that carries out research, manufacturing and marketing of minicomputers. The Taiji serialization of products includes the NCI 2780 minicomputer; the microminiaturized superminicomputer (TJ2220/2230); the supermicrocomputer (TJ386); industrial computers and high-speed array processing computers, etc. These computers have been distributed everywhere in the country and are being used in different fields and departments. They perform important tasks for our nation's defense. It is worth mentioning that in the recent successful lift-off of the "Asiasat I" satellite, Taiji minicomputers were utilized as the core of the satellite's [computer automated] measurement and control [CAMAC] system. Since the Taiji 2220/2230 product series was marketed in 1988, 400 units have been installed. More than 60 customers have purchased almost a hundred of the high-speed array processors. Within a few years, these domestically made computers have gained the users' trust. This has not been an easy task; the Taiji company has come a long, difficult way. Competing with advanced foreign manufacturers, they have gained their domestic market by the excellent quality of the product and thoughtful service.

With the approval of the Association of China Computer Users, the Taiji Serialization Association held a convention in Beijing on 18 April in order to keep up with the developing situation. The over 120 participants included departments of the State Commission of Science, Technology and Industry for National Defense, the Ministry of Railways, the State Education Commission, petrochemical units of the Ministry of Energy Resources, departments of the Ministry of Posts & Telecommunications, Beijing Municipality, and representatives of users' groups. Through deliberation and consultations among the users' representatives, a 29-member council was elected as the First-Term Council. Eleven standing committee members were also elected: Li Zhengnan as director of the council, and Feng Changxin, Liao Chuanjun, Chen Yong were elected deputy council directors. Zhu Pengju was elected deputy director and secretary. The association is linked to the Taiji Computer Company.

Zhu Xinfu, head manager of the Taiji Computer Co. and director of the North China Computing Technology Research Institute, gave a speech during the convention. He congratulated Taiji's establishment and he read a seven-point policy as a gesture to support the association and provide guarantees to the users: 1. Provide a lifetime service warranty. 2. Provide funds for the Taiji Serialization Association's activities. 3. Offer a 3-percent discount to the members of the association. 4. Offer a 10-percent incentive to members for the service fee after the warranty expires. 5. Will be responsive to the feedback of Taiji Assn. members. 6. Effective that day [18 April], a 24-hour telephone hot line was installed; the phone number is 2024115. 7. Will establish repair stations nationwide so that speedy services can be guaranteed. These "down-to-earth" practical policies were appreciated and welcomed by the users.

Monthly Exports of Legend 286 Microcomputers Reach 8,000 Units

90FE0159E Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 17, 2 May 90 p 1

[Article by Liu Jiuru [0491 0046 1172]]

[Text] While the computer market is generally slow, the "Legend" [Lianxiang 5114 1927] 286 microcomputers are selling well on the international market. Monthly exports have reached 8,000 units going to more than 30 countries in Europe and America. Among our country's exports of microcomputers, they have taken the lead.

The "Legend" 286 was developed by the Beijing Legend Computer Group at the end of 1988. Relying on its technical talent, through hard work in a race against time, the computer group successfully developed this excellent product in a short period of time. The product was admired by European and American businessmen at the World Computer Expo in Hanover, West Germany and in Chicago in the Spring of 1989. The group received monthly orders of 1,500 units from Europe and 3,000 units from the United States. Since June of 1989, monthly sales to Europe and the United States have reached 4,000 units. Since then, the Legend Group has continuously been increasing productivity and carrying out technical improvements so that the original unit has been perfected and has surpassed similar foreign products in terms of technical standards. Meanwhile, post-sales services have been strengthened. By the beginning of this year, output and export volume of the Legend 286 reached 8,000 units monthly. It only took a short period of 15 months from development to export to reach this gratifying result. The Legend Group has thereby become one of the biggest microcomputer exporters in the nation.

Recently, the Legend 286 was shown for the first time in the domestic market, and was welcomed by customers. The national philatelic organization specially published commemorative stamps for the Legend 286. It has been predicted that the Legend will have a considerable domestic market as well. It will play a role in promoting our country's popularization and applications of computers.

Vice Minister Zeng Peiyan on Seventh, Eighth 5-Year Plans

90FE0159C Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 17, 2 May 90 pp 1-2

[Text] Vice Minister of Machine-Building Electronics Industry Zeng Peiyan recently pointed out: "In the

context of electronics industry development during the Eighth 5-Year Plan, we must focus on the following: endeavor to make complete sets of large-scale equipment, strengthen basic product development, expand exports and monitor the world's new technology." The computer industry should especially follow this path. These were topics emphasized by Vice Minister Zeng during the recently held "Third Annual Meeting of the Semiconductor and Electronics Industry of Asia."

During this annual meeting, Zeng published a long paper titled "The Current Situation and Future Development Strategy of the Chinese Electronics Industry." The paper introduced the state of development in China's electronics industry during the past several decades. He also pointed out the focal points and measures for the nation's development of the electronics industry in the coming years. Speaking of the development situation of the nation's computer production, Zeng said that it has been progressing quite rapidly and it has reached a considerable scale for the first time. The annual output of the main products has been increasing yearly. In 1989, the production of mid-sized and minicomputers reached 1,314 units, output of microcomputers reached 59,700 units, output of peripheral devices reached 266,000 units and output of ICs reached 110 million pieces. Since the Seventh 5-Year Plan, tackling key technical problems and development of new products have been accomplished. Products include a laser editing and typesetting system for Chinese characters, Taiji 2230 superminicomputers, Huasheng 3000 engineering workstation, near-Earth satellite remote control systems and so forth. These computer developments and applications came close to or meet advanced international standards.

Based on the existing foundation, how do we further push computer production? Zeng proposed that the computer industry will have the most potential in China's electronics industry. He predicted that China's computers and peripheral devices will have a market value of 20 billion yuan by 1995. During the Eighth-5-Year Plan, microcomputers, minicomputers, minisupercomputers, peripheral equipment sets, and representative mechatronics equipment—all based on fourth-generation computer technology—should be the key products. Strategies for domestic development and technical foundations should be further established. Economies of scale are to be formed through [enterprise] groups and production bases. In the meantime, efforts should be made to actively increase research on and manufacturing of large and medium-sized computers as well as to track information on the next generation of computers and intelligent computers.

Software development is the key to industrial breakthroughs. Our country has rich resources that can be brought into play, while the need for software is increasing both domestically and internationally. In order to achieve a solution to software industry development, we should accelerate software development and establish a software industry, develop systems software and applications software, accelerate industrialization of software production, and increase the ability of providing software product for domestic and foreign markets.

Zeng said further: the popularization and utilization of computers will be strengthened even more in the next few years so that the development of relevant production can be promoted. Among the relevant production, complete sets of electronic systems may reach an estimated market value of 3 billion yuan by 1995. The 1995 demand for large-scale systems is estimated at 200 sets, for mid-sized systems at 2,000 sets, and for mini systems at 1,000 sets. Computers should serve areas such as energy resources and transportation. They should assist research and development in the following areas: traffic control systems for air, land, and water; complete sets of airborne and shipborne electronic systems; and automated power-grid monitoring; dispatch systems; electrical load-control systems; coal-mine safety monitoring systems; electronic oil-well logging equipment; major-disaster monitoring, prediction, rescue and command systems; multi-category numerical control systems; integrated automated industrial systems and so on. We should actively apply microelectronics technology, computer aided design, computer aided manufacturing, and computer aided measurement technology. We should produce large quantities of digitized, intelligent and automated electronic instruments so that the domestic market share for electronic instruments can reach 50 percent. The IC is the foundation of computer development, and we predict that the IC market will reach 5 billion yuan by 1995. We must make great efforts to be able to reach a capacity of 800 million IC chips and an actual annual output of 600 million IC chips by 1995. We should meet the basic domestic market's requirement for 5 μ m ICs and realize the 2-3 μ m technology for industrial production so that more than 50 percent of the domestic market requirement can be met. Finally, we should be able to produce serially products with 1-1.5 μ m technology.

Zeng emphasized that during the Eighth 5-Year Plan the development of China's computer industry must use science and technology as guidelines and depend on domestic development. We must increase exports, become more competitive in the market and under the strategy of "grasp application, promote development," advance to a new level.

New Integrated Software System Developed

90FE0159D Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 17, 2 May 90 p 1

[Article by Jiang [1203]]

[Text] An office automation system, specified as an integrated juzhen [5112 3791, a type of typesetting/arranging] system, passed specialists' appraisal in Shenzhen on 12 April. It is suitable for screen editing, word processing, report processing, graphics processing, office typesetting, communications, data management and filing. This is another successful result of the joint

research done by the famous Taiwanese scholar Chu Pangfu and the scientific and technical staff of the Shenzhen Science and Technology Industrial Park. It was preceded by the success of the "complete Chinese-character encoded input technology" research. The system was developed by Shenzhen S&T Industrial Park Corporation's computer lab and two firms in Shenzhen Cultural Science & Technology Ltd. According to appraisals from many well-known computer specialists of our country, the development of the juzhen integrated typesetting/arranging system will revolutionize the design of computer and data processing software systems.

The main specifications of the system are: 146 KB of internal space for windows, word processing, data base management, report processing, plotting, typesetting and communications, etc. The system's full-Chinese-character generator technically provides multi-font text and graphics dot matrix, which is an important base that enables the system to perform many functions. The key to the success of the system is the establishment and management of the free window environment. The designers utilized the integrated design method by taking into account the basic functions of traditional multi-purpose applications software through analysis and planning, then re-designed the software to be an integrated unit. At the same time, a unified user interface was also designed. In this way, the system became capable of tool-integration and interface-integration. The concept of free windows was initially created according to the characteristics of Chinese-character data processing. Treating the graphical image pattern as the core of the integration system and thoroughly expanding and improving the BIOS functions of the DOS operating system are worthwhile contributions toward software development in China. The concept is also regarded as an innovation internationally. The system has a very compact construction is of high performance. It makes low demands on the hardware environment and is easily introduced under the DOS environment. It holds the leading position among similar integrated software internationally for its speed, capacity, functions and integration.

Domestically Designed, Manufactured Laptop Microcomputer Debuts in Zhuhai

90FE0159B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 13, 4 Apr 90 p 1

[Article by Gong Binliang [7895 3453 5328]]

[Text] The reporter obtained the following information on the site of the China Electronic Science & Technology Development Company's Zhuhai assembly line: the company's Zhuhai Electronic Technology Research Institute will soon introduce to the market a laptop microcomputer, the ECI-286, which is independently designed and manufactured. Assembly is with mostly domestically made components. This unit is fully compatible with the IBM PC/AT. The clock speed is 12 MHz or 16MHz. The computer functions in the "0" or "1" wait [state]. It has features such as small size, light weight, high dependability and compatibility; it is easy to carry around. The unit is especially suitable for scientific computation, remote communications, word processing, software development and other areas.

The hardware consists of a 640x400 gas plasma flat-panel display or liquid crystal display, a 3.5-inch 720 KB or 1.44 MB floppy disc drive, a 3.5-inch 20 MB or 40 MB hard disc drive, an 84-key keyboard, an 80286 CPU, 64 KM ROM, 1 MB - 4 MB RAM, one Centronics interface, two RS232C serial interfaces, an internal 300/1200 Baud-rate modem and one I/O expander. It is powered by 220 V or 115 V AC and it can also use batteries.

The ECI-286 laptop microcomputer supports any version of IBM PC DOS and of CCDOS Chinese-character operating system. It can utilize PC software packages such as Lotus 1-2-3, Wordstar, etc. The power consumption of the unit is 35 watts (liquid crystal display) and its weight is 7 kg. The housing is domestically made. Air conditioning is not required and the computer can function between 0°C and 50°C and with 90 percent relative humidity without condensation. It can tolerate a 2-g (5 - 200 Hz) vibration and can function dependably under a 15g/11ms shock. It is a laptop microcomputer with mostly domestically made components.

Software, Hardware Exports Enter European, U.S., Japanese Markets

90FE0159A Shanghai JIEFANG RIBAO in Chinese 27 Mar 90 p 1

[Article by Jia Baoliang [6328 1405 5328]

[Text] Using advanced foreign technology as a stepping stone, the Shanghai Institute of Computing Technology has advanced its hardware/software product development and research to a new level. It also applied various flexible strategies in cooperating with foreign firms; in this way, it initially opened European, U.S., and Japanese markets.

The institute created four joint ventures with United States, Japan and other countries to develop technical products for export. These tasks are funded jointly. Technical staff members are sent abroad to perform joint development. The Shanghai "Quest" [Kai-si-te 0418 2448 3676] Company, a joint venture between the institute and the United States, has sent more than 40 Chinese staff members to the United States in cooperation with their U.S. partners to develop computer software. They have earned foreign exchange of more than $700,000. The Shanghai Future Software Development Company, a Sino-Japanese joint venture, has also sent its staff to Japan to jointly develop software for commercial applications based on the needs of Japan's domestic market. The outlook for this development is excellent. In addition, the logic circuitry/CAD software system developed by the "Feng Le" [0023 2867] joint venture between the institute and the United States has already

entered the U.S. market and made sales in the United Kingdom, Canada, Australia and 16 other countries. It has 227 customers and has been recognized by these foreign customers as a software product that has attained an advanced standard in the international market.

While developing products for export, the institute has also contracted hardware/software projects from abroad for manufacturing and export. A base specializing in manufacturing for export has been established at the institute.

Fuzzy Database Technology at World-Class Level

90P60020A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 20, 23 May 90 p 1

[Article by Zhang Xiuying [1728 4423 5391]: "China's Fuzzy Data Technology Reaches World State-of-the-Art"]

[Summary] One of the special projects in China's "863" High-Tech Development Plan—the development of a fuzzy deduction database management system (FDDBMS), as well as its first application, as a disease and nutritional consulting expert system—passed its technical accreditation, jointly sponsored by the National Defense Commission for Science, Technology and Industry, the Ministry of Aeronautics and Astronautics Industry (MAAI), and the "863" Intelligent Computer Expert Group, on 11 May. This system, jointly developed by MAAI's Institute No 204 and the Beijing Systems Engineering Institute, was appraised by the specialists as having reached the world state-of-the-art.

FDDBMS is based on a VAX computer's VMS operating system and on the RDB relational database management system, and uses the Pascal language to implement a fuzzy DBMS with deductive functions. The system, which has a fuzzy data operating language FDML resembling SQL [structured query language], permits several kinds of fuzzy operations on and calculations with the database information, including fuzzy inferential operations, fuzzy data expression and processing, and fuzzy knowledge representation and processing. The medical application system is designed for liver, kidney, heart, and diabetic patients, and for healthy people it can provide quantitative advice on nutrition and diet. This is China's first applied expert system possessing all these functions.

New Huasheng Series of RISC-Based Workstations

90P60020B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 20, 23 May 90 p 1

[Article by Xuan Gang [1357 0474]: "Huasheng 4000 Series of Engineering Workstations Debuts: Uses RISC Technology and Optical-Disk Technology"]

[Summary] At the recently concluded National Computer and Applications Products Trade Fair, Institute No 6 of the Ministry of Machine-Building and Electronics Industry [MMEI] formally unveiled its new Huasheng 4000 Series of engineering workstations as well as an erasable optical disk system. The new series preserves the functions of the Huasheng 3000 series—such as superior networked communications, fast graphics processing, and high-resolution display—and adds RISC (reduced instruction set computing) technology. Processing speed has been raised to 10MIPS [million instructions per second], five times that of the earlier series. The system also is equipped with a 600 Megabyte-capacity removable erasable optical disk drive. The erasable optical disk system, the first such domestically produced subsystem available in China, is compatible with the SUN series, Huasheng 3000 and 4000 series, and IBM microcomputer series.

Software for Digital Circuit Design

90P60020C Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 21, 30 May 90 p 24

[Article by Pu Qinchang [3450 0530 2490]: "Digital Circuit Design Automated Software"]

[Summary] The "digital circuit design automated software" developed by Nanjing Institute of Aeronautical Engineering recently passed the certification sponsored by the Jiangsu Province S&T Commission. Called SDSD (Software for Digital System Design), this new product, oriented toward industry, institutions of higher education, and research institutes, consists of 12 modules, including a text compiler, a graphics compiler, a logic simulator, a waveform analyzer, a function compiler, a standard component library (taken from the Texas Instruments data handbook series), and a pc-board wiring plotter. The user can work with the GHDL (graphics/hardware description language) provided with the system, or can employ the automatic schematic capture program for layout of logic circuits.

RISC-Based Parallel Processing System

90P60020D Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 22, 6 Jun 90 p 1

[Article by Chen Renfu [7115 0088 3940] and Xu Youhui [6079 0147 6540]: "East China Computing Institute Develops Parallel Processing System With RISC Technology"]

[Summary] The RISC-chip-based multiprocessor parallel processing system developed by East China Computing Institute early this year has been accredited by an expert group from the Ministry of Machine-Building and Electronics Industry's [MMEI] Institute of Electronic Science and Technology. The system is based on independently designed RISC [reduced instruction set computing] chips and on the Transputer series of chips produced by the British firm INMOS. Using a PC-AT computer for its host via a data-transfer interface

between the PC bus and the motherboard, the system can be controlled by host-run programs.

The motherboard consists of four card inserts (or sub-boards), each with one Transputer, including one 20MHz-clock T800 processor chip and a 2Mbyte diagonal-insert memory. Each T800 chip has a calculating speed of 10MIPS [million instructions per second] and 1.5MFLOPS [million floating-point operations per second]. Using internationally prevalent benchmarks, the four sub-boards operating together have a calculating speed of 30MIPS or 4.5MFLOPS. The system can run under the DOS or XENIX operating-system environments and is designed for the INMOS Company's serial Pascal and FORTRAN, and parallel C, FORTRAN, and Occam languages.

Analysis of Dependence of Frequency Determination Upon Temperature in SAW-Based Real-Time Chirp z Transformation Processor

40090022A Beijing SHENGXUE XUEBAO [ACTA ACUSTICA] in Chinese Vol 15 No 2, Mar 90 pp 121-129

[English abstract of article by Chen Dongpei [7115 2639 1014] and Gong Junjie [1362 0193 2638] (Institute of Acoustics, CAS) (MS received 8 Jul 88)]

[Text] SAW [surface acoustic wave]-based real-time chirp z transformation processor is widely accepted as one of the new supporting techniques for spectrum analysis in radar, communications, electronic warfare and radio telescope. However, a critical issue for a practical system is the dependence of frequency determination, which is the fundamental function of the processor, upon the temperature at which SAW chirp delay lines operate. A correct understanding of the temperature behaviour of the processor will pave the way for system design and temperature compensation. As we know, so far no satisfactory analysis theory has been established. In this paper, an analytic expression for analysing the variation of the determined frequency with the temperature is introduced to M-C configuration of the processor, which is deducted from a time scale principle. This expression indicates that the variation is not only dependent on the time-delayed temperature coefficient of the device substrate, but is also a function of device parameters and operation frequencies. Furthermore, by means of our theory, a reasonable explanation could be given to the discrepancy which appeared between the experiments and the theory done by Claude Lardat of Thomson CSF.

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On the Effects of Sensor Signal Fluctuation on the Performance of AR High-Resolution Array Processor

40090022B Beijing SHENGXUE XUEBAO [ACTA ACUSTICA] in Chinese Vol 15 No 2, Mar 90 pp 137-145

[English abstract of article by Ren Dejian [0117 1795 1696] and Zhu Weiqing [2612 4850 1987] (Institute of Acoustics, CAS) (MS received 11 Aug 88)]

[Text] The performance of AR [autoregressive] high-resolution array processor in presence of correlated sensor signal fluctuation is studied. Mean-square inverse beam pattern and pointing error are examined. Special attention is paid to the effects of referenced sensor and correlation between sensors. It is shown that fluctuation causes broadening or even distortion of the mean-square inverse beam pattern. Phase fluctuation causes pointing error. Its standard variance is proportional to that of fluctuation and is related to the number of sensors of the array. Correlation between sensors has important effects on pointing error.

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Real-Time General-Purpose Time-Compressed Correlator

40090022C Beijing SHENGXUE XUEBAO [ACTA ACUSTICA] in Chinese Vol 15 No 2, Mar 90 pp 146-150

[English abstract of article by Li Qihu [2621 0796 5706] et al. (Institute of Acoustics, CAS) (MS received 16 Aug 88)]

[Text] The time-compressed correlator has been widely applied in matched filters for active sonar since the 1960's. The principles of DELTIC and MACORMATIC cannot be directly used in passive sonar due to the limitation of sampling frequency and data length; otherwise the input data will be missed periodically in the system output. An Alternative Access Time-compressed Correlator (ALATIC) is proposed in this paper; by using a buffer register, the correlation operation of arbitrary length can be done in real time. This model is a general-purpose correlator, which can be used in both active and passive sonar. The running positive order and inverse order register and the shift positive order and inverse order model are presented. The hardware implementation and the flow chart graph of ALATIC is also described. The model presented in this paper can be used in digital sonar design.

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Micron-Size Vacuum Microelectronic Devices Developed

90P60021 Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 1 Jun 90 p 1

[Article by Wang Huangyan [3769 3552 1750]: "Chinese Experts Develop Vacuum Microelectronic Devices"]

[Summary] Xian, May 31 (XINHUA)—It has been learned from the recently begun Third National Field Emission Symposium that Xidian University [formerly Northwest Institute of Telecommunications Engineering] and Lishan [7537 1472] Institute of Electronics have jointly developed a micron-size vacuum microelectronic diode and triode. China is only the fifth country (after the U.S., Britain, France, and Japan) to have developed this new type of device, which is not at all similar to the old-style vacuum tubes. The integration density of an IC with these new micro devices is of such a scale that on a 1-square-millimeter silicon chip, over 10,000 of these vacuum devices can be etched.

Vacuum microelectronic devices can resist nuclear radiation and can function in high-temperature and changing-temperature environments, and are rated at very high operating speeds. They are useful in high-resolution flat-screen displays, such as in the coming generation of wall-mounted flat-screen TVs, and in very-high-speed computers.

Since the devices operate in the presence of an applied electrical field, they are often called field emitters. Xidian University professor Luo Enze [5012 1869 3419]—after whom the international scientific community has named the "Enze formula"—first proposed the theory, designed the geometrical structure of field emitters, and provided a quantitative computing formula.

Preparation and Superconductivity of Single-Phase $Bi_{1.65}Pb_{0.35}Sr_2Ca_2Cu_3O_y$ With Zero-Resistance Temperature 106.5K

40090020A Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 39 No 4, Apr 90 pp 661-666

[English abstract of article by Wang Shunxi [3769 7311 0823] et al. of the Departments of Physics and Applied Chemistry, University of Science and Technology of China, Hefei, 230026, and Zhang Qirui [1728 0366 3843] of the Department of Physics, University of Science and Technology of China, Hefei, 230026; Department of Physics, Zhejiang University, Hangzhou, 310027 (MS received 20 Apr 89)]

[Text] Samples with nominal composition $Bi_{2-x}Pb_xSr_2Ca_2Cu_3O_y$ (x = 0.30; 0.35; 0.40; 0.45) have been prepared by solid-state reaction. Phase and structure analyses have been performed, and the resistance-temperature relation and dc susceptibility have also been measured. The results show that the sample with x = 0.35 is a single-phase material. X-ray analysis and electron diffraction indicate that its phase structure is similar to that of 2223 phase; it is tetragonal with a = b = 5.414 angstrom, c = 37.106 angstrom. We observed also the modulated structure along a and b. The results of resistance-temperature and dc susceptibility measurement show that, when T equal to or greater than 50 K, there is only one superconducting phase of 107K. In addition, we find that the preparation conditions for the single-phase material (composition, sintering temperature and the quenching rate) are stringent. Like the 1-2-3 phase material, the oxygen content not only influences the phase, zero-resistance temperature of the sample, but also influences the transport property of normal state.

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Software Implementation for Computer Monitoring and Control System in 11-Meter-Antenna Satellite Earth Station

90FE0158 Shanghai DIANXIN KUAIBAO [TELECOMMUNICATIONS INFORMATION] in Chinese No 3, Mar 90 pp 12-15

[Article by Zhang Ling [1728 5376]; see also JPRS-CST-90-016, 12 Jun 90 pp 31-39]

[Text] Ever since satellite communications technology was put to practical use by INTELSAT, it has undergone rapid development; at the same time, satellite earth-station technology has also undergone constant innovations and improvements. Because the maintenance and repair of a satellite earth station must be performed under operating conditions, very high reliability requirements are imposed on the communications equipment. In an effort to improve the overall reliability of satellite earth stations, studies have been undertaken to consider the use of micro-computers for real-time monitoring and control in order to facilitate the timely detection and elimination of faults in the equipment.

A satellite earth station generally consists of the following components: the antenna, the high-power amplifier, the low-noise amplifier, the ground-based communications equipment (including the SCPC [single carrier per channel] up/down links), and the power supply. We have developed a computer-operated monitoring, alarm and control (MAC) system to perform real-time monitoring and control of the components of an 11-m-antenna satellite earth station. In this article, the implementation of the software architecture for the MAC system is described.

1. Basic Principle and Modules of the MAC System

1.1 Basic Principle

The MAC system of the 11-m-antenna earth station uses a microcomputer to perform real-time monitoring, alarm and control of the antenna, the high-power amplifier, the low-noise amplifier, and the ground-based communications equipment (including the SCPC up/down frequency converters, the SCPC terminal equipment, and the FDM up/down links) and the power supply. The data acquisition and processing functions, the display of status block diagrams, the printing and recording of data and operating conditions, the alarm for faults in the equipment and the control of the communications equipment are also performed by a microcomputer. In view of the real-time requirements of the MAC system, the software design divides the monitoring and control functions into several sub-functions. The sub-functions are managed by a special program whose primary tasks are to coordinate the real-time, synchronized operations of the sub-functions, to carry out information exchange and establish communications between the sub-functions, and to assign priorities to the sub-functions for proper scheduling. In addition, this program also manages a series of peripheral equipment including a 12-inch color display unit, a keyboard, a M2024 printer and a data-acquisition controller.

1.2 Basic Modules

In order to keep the program succinct, a modular design approach is used where the MAC software is divided into several subprograms (modules), each of which performs a specific function. These modules are linked together to form a complete program which performs the overall function; the module which links all the subprograms is called the main module. The unique feature of the modular design is that each module is of modest size, performs a specific function, and can be independently tested. Because of the relative independence of each module, it is easy to construct a program for the individual modules without having to understand the details of the modules. This type of software architecture facilitates programming, testing and future maintenance and expansion.

Based on the requirements of real-time monitoring and control of the 11-m-antenna earth station, the software of the MAC system is divided into five modules: The system initialization module, the real-time monitoring and measurement module, the display module, the print module, and the keyboard-command module.

(1) The System Initialization Module

The MAC system is a real-time system which has a one-second clock. The initialization module sets the clock parameter and the heading display parameters; it also sets the external circuit parameters, the interrupt vectors and variables, as well as the parameters for picture and data transmission.

(2) The Real-Time Monitoring and Measurement Module

The MAC system performs the function of real-time monitoring and measurement of the 11-m-antenna earth station by scanning the check points of the communications equipment through the data-acquisition controller and processing the scanned data.

(3) The Display Module

Based on the status information of the communications equipment obtained from the processed data, the MAC system displays in real time the operating status of the communications equipment on a color display unit; the displayed information includes the status block, diagram and the check-point data page.

(4) The Print Module

When a fault occurs in the communications equipment of the earth station, the print module prints the fault number, the time of fault occurrence, the time of fault recovery, the fault location, as well as the associated data of the check points, and the equipment interface number. It also records in real time the fault status of

every checkpoint of the equipment. When a print command is received from the keyboard, the module prints the real-time data of each check point, and thus provides a record of the operating status of the communications equipment.

(5) The Keyboard-Command Module

This module scans the keyboard at regular intervals, and decides if an MAC command has been issued from the keyboard; if yes, then it sets a command execution flag, or proceeds to execute a corresponding control command. The basic MAC commands are:

a. waveguide switch remote control
b. high-power amplifier control
c. clock initialization
d. display check point data
e. printcheck-pointdata
f. select status block diagram display
g. MAC command prompt

2. Software Implementation for MAC System

The MAC system operates on an IBM-PC/XT microcomputer, which is widely used in this country. In consideration of the storage, speed, and input/output requirements, the software for the MAC system is written in assembly language. The assembly-language program is developed under the support of PC-DOS; its flow chart is shown in Fig. 1.

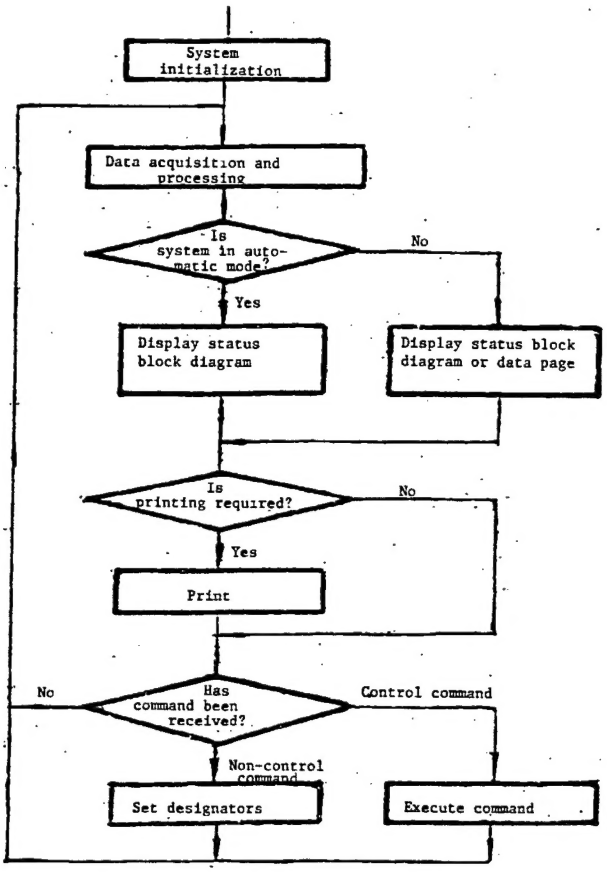

Figure 1

To facilitate information exchange between the modules, the following designators are used for inter-module communication.

a. AUTO-KEY	automatic mode
b. DISP-PAGE1	status block diagram display
c. DISP-PAGE2	communications equipment fault
d. CDISDP-STATUS	data display
e. ERROR-STATE	check-point fault
f. FUNCKEY-STATUS	function key status
g. F1-STATUS	F1 status
h. F3-STATUS	F3 status
i. F4-STATUS	F4 status
j. GOCOM-FLAG	command execution

In the MAC system, the status block diagram and data on the color display unit and the printed record on the printer reflect the operating condition of the earth station. The amount of data contained in a status block diagram occupies approximately 4 kb of storage. A storage area in the ROM region of the computer is allocated specifically for the display data of the MAC system, as shown in Fig. 2.

xxxx: 0000	
	antenna graphic data
xxxx: 1000	
	High-power amplifier graphic
xxxx: 2000	
	High-power amplifier graphic data
xxxx: 3000	
	Uplink graphic data
xxxx: 4000	

The use of static memory allocation improves program efficiency. When the software of the MAC system is initialized or re-started after a power loss, the graphic data are written into this region, which can be accessed by various program modules.

In addition, we have taken advantage of certain system functions of the PC to facilitate programming and testing. It is known that at the assembly-language level, the ROM BIOS of the PC allows the user or the system programmer to perform certain control functions without having to consider such details as I/O addressing, etc. These control functions can be used to simplify programming and testing for the MAC system. An example of using this function is the storage of graphics data into the display data region.

3. Main Functions of the MAC System

Testing of the modularly designed monitoring and control software for the 11-m-antenna earth station has been completed on the IBM-PC/XT computer. Its main functions are:

3.1 Real-Time Display Function

The status block diagram and check-point data of the communications equipment are displayed on the color display unit of the MAC system; the different states of the equipment are represented by different colors (see Fig. 3). There are a total of 11 status block diagrams.

3.2 Real-Time Print Function

The real-time data of the various check points are printed according to keyboard commands. When the equipment develops a fault or recovers from a fault, the time of fault occurrence or recovery, the fault location, and the real-time data of the check points are printed.

Color	Equipment status
Green	Normal
Red (flashing)	Fault
Yellow	Standby
White	Under maintenance

3.3 Fault Alarm Function

When a fault develops in a particular unit, the status block diagram of that unit is automatically displayed, with the faulty element and the check points flashing in red, and a flashing red symbol appears on the upper right-hand corner of the screen. At the same time, a fault record is printed by the printer.

3.4 Control Function

The waveguide switch and high-power amplifier can be controlled by keyboard commands.

4. Conclusion

The MAC system, which uses a microcomputer to perform the functions of monitoring, alarm and control of the communications equipment of the 11-m-antenna satellite earth station, has significantly improved the reliability of the earth station. In this country, the problem of real-time monitoring and control of a satellite earth station is still in the research and development stage. The software design described in this article for the real-time monitoring and control system has been successfully verified in practice. Since its implementation in the earth station, the MAC system has performed satisfactorily, and in April 1989 it passed technical certification by the Ministry of Posts and telecommunications.

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